THE GEET DEMYSTIFIED

By C.P. Kouropoulos

A brief description :

The GEET is a dynamic fuel-exhaust recycling device that can be fitted to an engine, between the air intake and the exhaust.

A model suitable for a small two- or four-stroke (lawnmower or small generator) typically consists of two horizontally-lying, concentric steel or metallic pipes of about 50cm in length, one inside the other. The outer pip has an inside diameter of 25.4mm, the inner pipe an outside diameter of 12.7mm and an inner diameter of 12.4mm. Within the latter is a long solid steel or iron bar, whose diameter is 12mm, that doesn't touch it, except three solder points at each of its extremities. Let us call A and B the two ends of the 50 cm long pipes and bar.

The exhaust from the engine travels

* From A along the"outer" concentric space, between the two pipes, to B.

* From there, it is sent bubbling at high pressure to the bottom a jug of water with some fuel that is vapourized the heat.

* It is then sent along the inner pipe, in the thin space round the central solid steel bar, back from B to A, to ne

the air intake, where it is mixed with some fresh air.

* The latter mixture is input to the motor

A preliminary analysis of the GEET

Two-strokes are known to be inefficient as only a certain proportion of their fuel is burnt.

Their exhaust typically consists of the following :

1/ Air somewhat depleted in oxygen

2/ Carbon dioxyde

3/ Carbon and nitrogen monoxyde

4/ Water vapour

5/ Unburnt volatile gasoline

6/ Particles of heavier hydrocarbons, lubrifying oil and soot

In the case of four-strokes, there is less of 5/ and 6/

* As the exhaust first travels between the "outer" space, between inner and the outer pipes, it heats their surface its own temperature. In order that this temperature be as high as possible, the outer pipe should be thermally insulated with a glass wool jacket. Another contribution to higher temperatures at the inner surface of the outer pipe involves the Ranque-Hilsch effect : the exhaust flow should spiral, so that the hotter components in the gas gather against the outer surface where the steam is more thoroughly reduced into hydrogen while the pipe surface is oxidized. In turn, the released hydrogen reacts with the carbon dioxide into carbon monoxide and water ($CO_2 + H_2 \rightarrow CO + H_2O$) at high temperatures, while the steam can again be reduced by the hot iron into hydrogen. Provided that the outer surface of the cooler inner tube contains catalyzers such as nickel, already at 200°C, carb dioxide and hydrogen combine into methane and water ($CO_2 + 4H_2 \rightarrow CH_4 + 2H_2O$), the latter of which can again be reduced at the hotter surface of the outer pipe. Therefore, both the water and the carbon dioxide are reduced,

exhaust becomes depleted in carbon dioxide and enriched in fuels such as carbon monoxide, hydrogen and methane.

* This pretreated exhaust bubbles through the jug of water and fuel, the latter remaining at the top when not miscible (gasoline, heavy fuel or miscible glycol alcohol, etc). The depth of the water increases the pressure in th preceding reducing stage. Now, along with some soot, heavy hydrocarbons and unburnt fuel that are recycled, th carbon dioxide dissolves in the water and is removed from the exhaust so long as the water isn't saturated. To increase the amount of carbon dioxide dissolved, the pressure should be maximal and the water circulated. In critical closed-cycle applications, the resulting carbonic acid could react with a metal such as zinc or magnesium release hydrogen. The resulting carbonate and hydroxide, as wells the reducing metal of the inner surface of the outer pipe could then be recycled later by using solar energy.Another option is using some mix of photosynthetic algae in an adjacent first stage to convert the carbon dioxide into oxygen and biomass, and fermenting anaerobic bacteria in a second stage to generate methane and hydrogen from the latter.

* The fuel as well as some water are vapourized in the bubbler.

* The cooled and enriched exhaust now travels at high speed inside the inner pipe, as the available space is thin, round the solid steel bar. Here, it must be observed that there are heat gradients, as the outer surface of the inner pipe is heated by the exhaust, while the steel bar inside that doesn't touch it is cooled by the cooler flow of the bubbled exhaust. The Ranque-Hilsch effect can again be used to further reduce the temperature round the inner bar. This involves replacing the three extremal solder points by small soldered coiled lines of wire at the B end o the iron bar.

* Some of the previously generated hydrogen may, here again, catalytically combine with the remaining carbon dioxyde into methane and water against the outer surface of the nickel inner tube.

* Because steel is magnetic and its Curie temperature is even higher than that of the outer, hotter pipe, all the surfaces inside the GEET are mesoscopically strongly magnetized, locally, on the level of magnetic domains of about 80nm, even if this magnetism isn't apparent macroscopically. However, only the inner steel bar is in conta with a sufficiently cool flow so it is below the Curie temperature of the Magnegas.

As a result, when the molecules bounce against the surface of the pipes, they experience a strong magnetic field o several Tesla. As R.M. Santilli has shown, diatomic molecules such as H_2, O_2 and CO can be magnetically polarized, and may assemble into clusters that this researcher calls magnecules. These have a Curie temperature which is at about 150°C for H_2 and CO. The rate of formation of such magnecules will thus be higher on the cooler surface of the steel bar. The corresponding magnetically polarized gas is called a Magnegas(TM). Because most chemical reactions involve polarized molecules while ordinary gases are unpolarized, magnegases release fa

more energy than expected from the combustion of their unpolarized counterparts. Also note that, due to the recycling, the O_2 molecules may pass several times into the magnetically polarizing cavity.

MASER emission might also occur in this cavity, which might accelerate the formation of magnecules

The recycled and enriched exhaust thus in the end contains

* CO, NO, O_2 and H_2 molecules, the latter resulting from the reduction of steam on the outer hot steel surface o from biomass recycling.

* Magnecules of the latter.

* Some methane from catalytic conversion of carbon dioxide and hydrogen or from biomass

* Recycled unburnt fuel

* Vapourized fuel from the bubbler

* Less CO_2 than in the original exhaust, at least until the water becomes saturated in the simplest devices. This suggests the importance of increasing the pressure in the bubbler

The mechanisms involved suggest an improvement in efficiency from

* Thermally insulating the outer pipe

* Placing reducing elements at the inner surface of the outer pipe, with high surface area if in the solid state, o as a liquid circulating blanket maintained by centrifugal forces in a rotating configuration.

* Using spiralling vents at the entry of the exhaust into the cylindrical outer space, and coiled elements at the entry of the bubbled exhaust round the inner bar so that the flow spirals and, by the Ranque-Hilsch effect, concentrates its hot components on the outside and its cooler ones on the inside.

* Using a steel or alloy with high magnetic permeability and saturation, or very pure Iron for the inner bar

* Polarizing the fuel in the bubbler into a Magneliquid, and the fresh air into a Magnegas

* Increasing the pressure at the bubbler so that a maximal amount of carbon dioxide is dissolved

* Using a metallic powder of Zinc or Magnesium so that the resulting carbonic acid releases hydrogen and carbonate in critical closed-cycle applications, or a multistage biomass of photosynthetic algae and anaerobic bacteria to convert the carbon dioxide into oxygen and biomass and the latter into methane in less critical or fixed applications.

The central iron bar should be at less than 150°C (the Curie temperature of Magnegas), the surrounding catalytic pipe at about 200°C (that converts carbon dioxyde and hydrogen into water and methane), and the outer pipe at y higher temperatures.

According to the inventor, Mr Pantone, the central steel or iron bar acquires an overall magnetization and must always be oriented in the same way with respect to the magnetic north in devices where it is horizontal, and similarly with respect to the vertical, when vertical.

The energy balance

On the minus side :

* The vapourized fuel spent (whatever the actual proportion of fuel in the bubbler, which can be as low as 20%

* The steel or reducing agent oxidized, mainly at the inner surface of the outer pipe

* The metallic powder turned into carbonate.

On the plus side :

* The unburnt fuel and hydrocarbons recycled, especially for two-strokes

* The unburnt CO and NO recycled

* The increased energy released by the use of magnecules

* The possibility of using a wide variety of cheap fuels

* Dissolved CO_2 converted to oxygen and biomass and then the latter into methane and hydrogen in several stages or into carbonates and hydrogen by a metal in the bubbler itself or some adjacent reactor.

Any test of exhaust emissions should take into account the CO_2 retained in the water. Also note that, when this CO_2 is eventually released in the atmosphere or recycled, one is left with a brew consisting of residual, unvolatilized fuel, soot and various heavy hydrocarbons, which would be ideally suited for recycling in a "Hadronic Reactor" into Magnegas. Thus, provided that the overall cycle proves to have a favourable efficiency, there might be a synergy between the GEET and Hadronic reactors, as they both involve Magnegases and the waste from the one may be taken as starting materials for the other.

For most two-strokes, there should be quite a significant improvement in efficiency from the recycling of the unburnt fuel alone. For other motors in which there is less of the latter, the gain could be lower but still not negligible. Note also that the Magnegas produced in "Hadronic Reactors" is unsuitable for two-strokes, as these require a liquid fuel into which the lubricating oil is mixed.

Thus, this system has several positive points. On the other hand, claiming that it runs on 80% of water and 20% fuel when this is just the proportion that is present in the bubbler where the fuel is preferentially vapourized by th hot exhaust, ignoring the oxydation of the metal in the pipes and their effective lifetime, ignoring the CO_2 retained in the water, especially during the first ten minutes after start-up, as well as the liquid wastes that are produced when measuring the exhaust emissions and not mentionning for how long a specific test was performed can be very misleading, to the point of bordering on fraud.

Suggested improvements involve the use of spiralling aerodynamic flows so as to optimize the temperature gradients at several key locations by the RanqueHilsch effect (to minimize the temperature round the central iron bar, and maximize it at the inner surface of the inner and outer pipes), thermally insulating the outer pipe, increasing the pressure so as to maximize the solution of carbon dioxide in the bubbler, and circulating the resulting carbonic acid in adjacent reactors, using a multistage configuration of photosynthetic and anaerobic recycling biomass to convert it to oxygen and methane or using a reactive metal to release hydrogen in certain critical closed-cycle applications. Solar energy can be used at a later stage to release the oxygen taken up by the reducing metal and recycle it.

See the Other JNE's Links on the SUBJECTS Page

JOURNAL OF NEW ENERGY

Volume 4, Number 1

Summer 1999

ISSN 1086-8259

How to order!

The Physics of Nuclean Energies and Fuels According to Hadronic Mechanics

EDITORIAL COMMENTS

The Physics of Nuclean Energies and Fuels According to Hadronic Mechanics

This issue should be of special interest to the NEWENERGY COMMUNITY of doers and scholars Prof. Ruggero Maria Santilli (President, Institute for Basic Research; Editoin-Chief for ALGEBRAS, GROUPS AND GEOMETRIES, HADRONIC JOURNAL, and HADRONIC J. SUPPLEMENT; and Editor of INTERN. J. PHYSIC BALKAN J. of GEOMETRY and its APPLICATIONS) has provided this journal with a fivpaper summary of his life's work.

The basic concepts of Santilli's work are: Quantum Mechanics is valid for distributed matter where elementary partice can be treated as mathematical pints but must be modified in atomic nuclei where various elementary particles cannot properly be treated as point sources. After 22 years of diligent study, Santilli and other mathematicians, scientists, an experimentalists have developed Hadronic Mechanics. The outgrowth of Hadronic Mechanics, as presented in this issue. more fully and accurately describes various nuclear and molecular processes. Especially, the complex nuclei an their forces can be described without loss of application of wellknown physical laws. This achievement has led to a nuclear and molecular theory that is of great importance to the NewEnergy Community. Santilli's nuclear theory, for example, predicts that under proper photon (or proton) bombardment unstable nuclei can be transmuted directly into stable nuclei. This combination of Santilli's theory and the unusual and unexpected results from Trenergy's experimental work in low-energy transmutation has resulted in the beginnings of mutual cooperation among Dr. Santil and his staff and the work of Dr. SX Jin (chief scientist for Trenergy, Inc., Salt Lake City, Utah) and his associates (including this editor). Santilli's work is not limited to transmutation.

Dr. Santilli and his colleagues, with their development of Hadronic Mechanics, have provided the FIRST theory for t understanding of new energies. This theory is mathematically and physically consistent, verifies existing physical law (e.g., Pauli's principle, etc.) so that the theory will survive academic challenges and detailed study. This work provid the basis for the evaluation and further development of a considerable body of experimental discoveries of new energies and new fuels, and most important, this theory has specific predictions of practical concepts for the actual construction of efficient new-energy producing machines.

The Journal of New Energy is pleased to provide, in one volume, these five summary papers by Professor Santilli, on Hadronic Mechanics, as a rational basis for understanding the important role of both nuclear and molecullevel

processes in new-energy developments. Please note that this work will be included in the next issue of the CD-ROM, The Science of the Future Began Yesterday. This CD-ROM will contain the full text of all issues of the Journal of New Energy including this issue; the Proceedings of the 1999 INE Conference (August 27-28, 1999, Salt Lake City, Utah); and a special issue on the New Maxwell Electromagnetic Equations; and, in addition, complete bibliographic references and the complete text of all articles or reviews printed in Fusion Facts and in New Energy News for the pa ten years.

Please note the important announcement, for the first time, that MagneGasTM, a new fuel, has a coefficient of performance (COP) of 1.69. (See Paper V, Section 3.12, page 286.) MagneGasTM is a combustible gas produced us a specially-controlled D.C. arc within liquid wastes (such as spent radiator coolants and other polluting materials). Th gas would normally be expected to have a COP of 0.2 or 0.3, however, as an application of Hadronic Mechanics this gas has achieved a COP of 1.69. This achievement by the use of Hadronic Mechanics is expected to improve the efficiency of other new-energies. This new fuel has been developed by Dr. Santilli and the technical staff of Toups Technology Licensing, Inc., a public company located in Largo, Florida. This exciting new product is the forerunner other new fuels and new energy sources that will be developed in the future, based on use of Hadronic Mechanics.

For further information about this new fuel, please contact Mr. Leon Toups, president of Toups Technology Licensin Inc. at 727-548-0918 or by fax at 727-5498138 or visit the website www.toupstech.com.

Respectfully, Hal Fox, Editor

JOURNAL OF NEW ENERGY
Volume 4, Number 1, Summer 1999

The Physics of Nuclean Energies and Fuels According to Hadronic Mechanics

Contents:

For submission of articles for future publication in the Journal of New Energy:

See the JNE Author's Instructions

See the Other JNE's Links on the SUBJECTS Page

Committee on Scientific Ethics

Palm Harbor, Florida, November 2, 2000

Dr. DAVID HAMILTON
Department of Energy
EE-32, 5G-046 Forestal Building
1000 Independence Avenue
WASHINGTON, DC 20585

RE: BREAKTHROUGH ENERGY PHYSICS RESEARCH (BEPR) PROGRAM

Dear Dr. Hamilton,

I am writing this letter following your request to express my most emphatic support toward the approval by DOE of t proposed BEPR Program. I have dedicated my life to the search for new clean energies and fuels. I am taking the liberty of outlining the results of my research which I initiated in 1978 when I was at Harvard University under DOE contracts ER-78-S-02-47420.A000, AS02-78ER04742, then continued at the Institute for Basic Research under DOE contracts DE-ACO2-80ER10651, DE-ACO2-80ER-10651.A001, and DEACO2-80ER10651.A002 of which contracts I still keep a detailed documentation (including all original canceled checks). In this letter I summarize the main aspects, outline the theoretical, experimental and industrial evidence, enclose a copy of web site [1], enclose a copy o all quoted papers published in refereed mathematics and physics journals (other than the five journals in which I am a editor), and include material pertaining to my qualifications.

THE CURRENT PRIMARY NEEDS OF OUR COUNTRY. According to a rather vast consensus, they are:

1) Achievement of independence from Arab oil. This requires the difficult task of developing a new technology capab of producing a new fuel in unlimited amounts and at a cost competitive over that of fossil fuels. These requirements exclude any fuel technology available today, thus mandating the search for a really new technology.

2) Identification of fuels resolving the alarming environmental problems caused by fossil fuels. The current use of 74 million barrels of crude oil per day has caused the following main environmental problems: i) A disproportionate emission of carcinogenic and other toxic substances in out environment estimated to be of the order of five million to per day; ii) Disproportionate emission of 10 million tons of carbon dioxide per day; and iii) Disproportionate depletio of breathable oxygen from our atmosphere (as established by the very existence of the green house effect) estimated t consists of the depletion of 3 million tons of oxygen per day. These alarming problems are not solved by available fuels, such as: hydrogen, whether as a direct fuel or for fuel cells (because combustion of hydrogen implies such an oxygen depletion to be potentially lethal for the human race if used in very large quantities and not originating from t separation of water); natural gas (because it emits about 40% more CO2 then gasoline for the same performance); battery-operated electric cars (which are very polluting vehicles since the primary energy for the production of electricity is dramatically more polluting than gasoline); and other fuels (see the enclosed note on oxygen depletion from [1]).

3) Identification of basically new, nonpolluting, primary sources of energy for an environmentally acceptable production of electricity. This need is established by the notorious insufficiency of renewable energy sources, such as solar or wind energies, and requires a reinspection of and basic advances at the ultimate foundations of our scientific knowledge at all its levels, including basic advances in particle physics, nuclear physics, molecular physics, superconductivity, astrophysics, gravitation and cosmology.

NECESSARY PRE-REQUISITES FOR THE ACHIEVEMENT OF THE PRIMARY NATIONAL NEEDS. It was scientifically established in the 1970's, and industrially confirmed more recently, that it is impossible to serve the

primary interests of our Country if the research is restricted to be compatible with Einstein's doctrines, quantum mechanics and quantum chemistry. At any rate, the new relativity, mechanics and chemistry developed out of the indicated DOE contracts have already provided serious contributions toward our primary needs.

Physics is a discipline proved by history never to admit final theories. Debates on the appropriate selection of broade theories are scientific valuable. However, the assumption in DOE and NSF programs of Einsteinian doctrines, quantu mechanics and chemistry as being of final character creates serious problems of scientific ethics and accountability in the use of public funds, due to the a priori need of unrestricted research vis a vis huge national needs. To put it blunt all academicians or governmental officers supporting the unlimited validity of Einsteinian doctrines, quantum mechanics and chemistry are now openly dubbed friends of the Arabs" irrespective of whether Jewish or not, becaus as outlined in this letter, Einsteinian doctrines, quantum mechanics and chemistry are known to prohibit the achievement of fuel independence by our Country and our allies.

INDUSTRIAL EVIDENCE PERMITTING FUEL INDEPENDENCE. As stated in the original literature dating back 1978, my DOE contracts were aimed precisely at the laborious search of new clean energies at the particle, nuclear a molecular levels. Upon achievement of the necessary maturity in the new theories, among a number of predicted new energies outlined below, I gave priority to new clean energies at the molecular level precisely in view of the indicated national need of fuel independence, with the evident intent of studying additional new energies at the nuclear and particle level at a subsequent time.

I am pleased to report the availability now of basically new reactors I have called hadronic reactors producing two different energies: a new fuel called magnegas plus heat. These energies are produced from the recycling via submerged arcs of contaminated liquids, such as antifreeze and oil waste, industrial and agricultural waste, etc. (see enclosures from []1]).

Recent extensive measurements conducted at an EPA certified automotive laboratory in Long Island (see enclosures from [1]) have established that magnegas exhaust surpasses all EPA emission requirements without catalytic converte while emitting in the exhaust 12% to 14% of breathable oxygen, and reducing carbon dioxide emission by about 40% over that due to gasoline (see the enclosures from [1]). Therefore, a fully American (actually, Floridian) fuel availabl now can indeed provide a serious contribution toward the resolution of the alarming environmental problems caused b fossil fuels.

Since one of the best liquids for hadronic reactors is sewage (which is continuously available in large amounts everywhere), the new technology can indeed seriously contribute to the achievement of fuel independence by Americ and our allies. As you can see in the enclosed pictures from [1], a hadronic reactor of the size of a desk, completed b conventional compressor, can turn current gasoline distributors" into fuel "producers." If high pressure bottled are added, refilling a pressure tank with magnegas is faster and safer than filling up a gasoline tank.

Since the new fuel is produced as a byproduct of recycling liquid waste, it can indeed be cost competitive with respec to gasoline, evidently when produced in comparative volumes. As an illustrations, current costs for the processing of sewage are expected to cover the operating costs of hadronic reactors, thus yielding a combustible gas whose cost is essentially reduced to that of compression, storage and delivery (see again the enclosures from [1]).

It should be mentioned that an excellent liquid for the new hadronic reactors is crude oil. Therefore, contrary to a possible first impression, the new technology can be one of the best friends of oil interests since it can process crude into a new fuel which is dramatically cleaner than gasoline at a price which is lower than the processing via refineries

With the understanding that the scientific energy balance is always smaller than 1, a main feature of the hadronic reactors is that of having a large commercial over-unity" (i.e., the ratio between the sum of the two energies produced divided by the electric energy used for their production) beginning from the very first prototype operating at atmospheric pressure and 12 kWh, as certified by the independent laboratories Motorfuelers, Inc. (see the enclosures from, [1]). The missing energy evidently originates from the liquid recycled which is not included in the commercial energy balance since it brings an income, rather than costing money. Therefore, hadronic reactors were conceived to

tap energy within liquid molecules in essentially the same way as Fermis reactors were conceived to tap energy within liquids. Much bigger commercial overunities are being measured with the new generations of reactors at bigger pressure and and/or kWh under construction in the U.S.A., Europe and Asia.

I should report that, immediately following the measurement of the indicated commercial overunity, I requested systematic measurements of possible radiations. I am pleased to report that the hadronic reactors where certified by th Radiation Detection Associates of Florida as being completely free of any harmful radiation or waste. It is therefore evident that, once subjected to systematic research, hadronic reactors and their commercial overunity can indeed significantly contribute toward the achievement of a clean, primary source of energy.

Following the achievement of operational maturity in the new covering theories, I first developed the new technology in 1998-1999 at Toups Technology Licensing, a public company in Largo, Florida, with Mr. Leon Toups as Presiden The company is now called EarthFirst Technologies, Inc (EFTI) with Mr. John Stanton as President. The technology now being developed by: UsMagnegas, Inc. (13100 Belcher Road, Largo, FL 33773, Tel. 727-597 9520, fax 727 8261, e-address info@santillimagnegas.com) with exclusive rights for the American continent; EuroMagnegas, Ltd in London, with exclusive rights for Europe, Africa and the Middle East; and AsiaMagnegas, Limited in Hong Kong wh exclusive rights for Asia.

I should stress that, by no means, the magnegas technology is unique, since American ingenuity has no limits when properly supported by governmental agencies with a vision and a real commitment to serve our Country.

EVIDENCE MANDATING THE SURPASSING OF OLD THEORIES. A main objective of this letter is to indicate that the new hadronic reactors are not permitted by Einsteinian doctrines, quantum mechanics and quantum chemistry This is so for a variety of reasons. First, there is the impossibility to conceive the large commercial overunity of the new reactors via the doctrines of the past millennium. Assuming that somebody could manage to derive the new reactors via Einsteinian doctrines, the deviations between the predictions of old theories and the experimental data are so big to disqualify any attempt. Even assuming that extremely esoteric manipulations of evidence to preserve old theories manage to represent experimental data on hadronic reactors, old theories collapse because of the evidence established at numerous laboratories (including the MacClullan Air Force Base in Sacramento, California) that the chemical composition of magnegas is completely untreatable by quantum chemistry and its current methods of detection, a features which has permitted the identification of a new chemical species, the first following the discover of the valence in the 18-th century, I have called magnecules (see the enclosures from [1]).

There comes a point in the life of all scientists, including DOE and NSF officers, in which desperate attempts to maintain beloved theories become disqualifying and can, at the extreme, imply the crossing of the boundaries of our Codes of Laws particularly in face of primary national needs, because the existence of hadronic reactors is a concrete evidence available now of the limitations of old doctrines and their impossibility to permit the achievement of fuel independence by our Country.

LACK OF FINAL CHARACTER OF SPECIAL RELATIVITY, QUANTUM MECHANICS, SUPERCONDUCTIVITY AND CHEMISTRY. Special relativity has a majestic beauty and validity for the condition of its original conception (electromagnetic waves or point particles moving in vacuum under action-at-a-distance interactions) which validity is verified every day, e.g., in particle accelerators.

The mere observation (and admission) of experimental evidence in our environment establishes the inapplicability (an not the "violation") of special relativity under conditions for which it was not proposed, interior problems of light and extended particles moving within physical media.

My entire research life has established that the inapplicability of Einsteinian doctrines within the hyperdense mediumn the interior of hadrons, nuclei and valence bonds has a fundamental relevance for our national needs. In fact, the new effects beyond Einstein occurring within said media directly permit the conception and industrial development of new clean energies and fuels, as already proved by the hadronic reactors which are based precisely on said non-Einsteinian effects. The same situation occurs for numerous others topics of innovative research contained in the proposed BEPR

Program.

DOE and NSF officers are, therefore, made aware with this letter that, as outlined below and technical treated in the enclosed papers, lack of support for research on the inapplicability of Einsteinian doctrines for interior problems or la of support for the other innovative research contained in the proposed BEPR Program constitutes direct opposition to the indicated primary needs of America and its allies.

There is no need to conduct new experiments to see the inapplicability of Einsteinian doctrines within interior media, because it is established by the mere observation, and above all admission, of physical evidence in our environment.

Consider the propagation of light in our environment. When propagating in our atmosphere, it travels at a speed v < to acquire a different speed v' < c when traveling in water, and then to acquire a yet different speed < c when traveling through our glasses, yet another different speed v'' < c when traveling through oil, etc.. The very existenc of a light spectrum from a prism is evidence of different speeds within the same medium for different frequencies. Ths establishes that, contrary to the politicalnonscientific academic preaching o "the universal constancy of the speed of light", in the physical reality the speed of light is a local variable depending on the characteristics of the medium in which it propagates as well as its frequency. When facing this evidence, orthodox physicists come out with the conjecture that different speeds of light in interior conditions are due to the scattering of photons through the atoms o different substances, so that each photon travels in vacuum at the speed c. This posture has been known since Lorentz (who was the first to study speeds different than c) to be complete nonsense, e.g., for radiowaves traveling in out atmosphere with one meter in wavelength. The same posture has been crushed by the recent evidence of speeds v > for which the reduction of light to photons traveling in vacuum becomes pure nonscientific nontechnical nonsense.

Thus, any belief that a theory conceived for light moving in vacuum with constant speed c can equally apply to locall varying speeds within physical media, is sheer scientific corruption (the use of weaker terms are discouraged here because they may imply complicity in serious lack of scientific accountability in the use of public money).

Independently from the above well known evidence, the inapplicability (and, again, not the"violation") of special relativity in interior conditions is established by a variety of additional already existing evidence. Another case is the Cerenkov light in the water pool of nuclear reactors. As it is well known, the evidence in this case establishes that ordinary electrons travel faster than the local speed of light. Orthodox physicists claim that the speed of light in vacuu remains the maximal causal speed in water, a posture crushed by the fact that the relativistic sum of two speeds of lig in water does not yield the speed of light in water, with consequential collapse of the axiomatic foundations of Einsteinian doctrines. After being cornered by this evidence, the same"scientists" venture the conjecture that the maximal causal speed in water is the local speed of light, a posture, posture which is crushed by the consequential violation of causality or the fact that fully conventional electrons are turned into hypothetical tachyons, thus exiting an boundary of science.

The sole reality which can be admitted under serious scientific accountability is that special relativity is inapplicable f all interior problems, thus including the Cerenkov light. Technical evidence on the impossibility for special relativity be exactly valid within hyperdense hadronic matter is simply overwhelming, of course, when considered within a scientific-nonpolitical environment (see, for brevity the enclosed paper by Arestov et al [2]), the approximate validity of beloved doctrines being evident.

The above inapplicability of special relativity identifies THE central problem of the research initiated under the indicated DOE contracts: the construction of a covering relativity applicable within physical media under the conditio of admitting special relativity identically when motion returns to be in vacuum (see an outline of the results below).

In view of the sizable national interests here at stake, DOE and NSF are strongly recommended to acknowledge the limitations of quantum mechanics identified throughout the 20-th century, such as: progressively increasing deviation from spectroscopic experimental data for all atoms other than the hydrogen (due to nonlocal effects from the wave overlapping of electrons from the helium on); inability to represent quantitatively the evidence that the two electrons the helium are not isolated, but orbit in a bonded form most of the time as experimentally proved by

photodisintegrations; deviations in neutron interferometric data whenever thermal neutrons travel within matter; and several other insufficiencies identified in the literature, although generally kept as "the best secret of the trade.

To avoid evident problems of scientific accountability, DOE and NSF programs should assume a theory as being "exactly" valid only when it represents the totality of the experimental data in an exact form directly from first principles without ad hoc adulterations to fit the data. In particular, the claim that quantum mechanics is exactly valid following the introduction and fit of unknown parameters, as it is routinely done in the Bose-Einstein correlations and condensation to mention only two cases among many, such an introduction of unknown parameters is scientific corruption because the unknown parameters are in reality a direct measure of the deviations of the theory from first principles (e.g., a representation of experimental data on the Bose-Einstein correlation requires off-diagonal elements in the vacuum expectation values which are prohibited by the axioms of quantum mechanics).

At any rate, if Einstein, Podolsky, Rosen and other famous physicists of the first part of the 20-th century could repeatedly state that quantum mechanics is "incomplete," any contemporary claim of final character of quantum mechanics is sheer scientific corruption, if not a violation of the Codes of Laws.

There is no doubt that nuclear physics has achieved outstanding results in the 20-th century. However, on strict scientific grounds, contemporary nuclear physics provides only a first approximation of nuclei because too many nuclear data have not been represented in with the needed accuracy or in a meaningful way. As an example, after abo one century of research and a river of public money, nuclear physics has been unable to reach a credible representatio of total nuclear magnetic moments (after all possible relativistic corrections, nuclear physics still misses 1% of the magnetic moment of the deuteron, with embarrassing large percentages missing for heavier nuclei). There exist a number of manipulations representing nuclear magnetic moments via a combination of states, which are also example of scientific corruption since the experimental data on nuclear magnetic moments are known to have been measured strictly for the ground state, besides, a mixture of states violates the very basic quantum principle of transitions betwe states requiring the emission or the absorption of quanta which exists solely in the imagination of corrupt physicists; nuclear physics has been unable to explain why the deuteron has spin 1, since this value is against all basic principles quantum mechanics requiring spin zero for the ground state of two-body systems; studies on the nuclear force have now reached truly embarrassing conditions because of the addition of dozens and dozen of potentials without any resolution of the problems, none of which has true physical foundations (since you need action at a distance to admit potentials, while nuclear structures are known to admit nonpotential internal forces); shall I keep going?

Enrich Fermi clearly expressed in his Lecture Notes doubts as to whether conventional geometries are valid in the small regions of space within a nuclear constituent. In so doing, Fermi confirmed to be a real scientist. By compariso contemporary academicians or governmental officers supporting the terminal validity of nuclear physics in its current form commit acts of scientific corruption in direct conflict with primary national interests.

The limitations, insufficiencies or sheer inconsistencies of quantum chemistry are so huge to be truly incredible, e.g.: The forces used in molecular bonds have a null average thus leaving current molecular models without a real bond; 2 had one of my first year graduate students prove that, under the currently assumed molecular forces (exchange, van d Waals and other forces), the hydrogen molecule can be H5, H7, H32, you pick the number of constituents, because th forces of current use were conceived in nuclear physics under the condition to have an arbitrary number of constituen 3) I had another graduate student in physics prove with a theorem that current molecular models necessarily imply tha all molecules are ferromagnetic in dramatic disagreement with experimental evidence, because in current models atom preserve their independence, in which case quantum electrodynamics mandates the achievement of the same magnetic polarization for all atoms in all molecules under an external magnetic field.

A real scientific disgrace for American science, because of the predictable condemnation by posterity, occurs in the current manipulations to represent experimental data on molecules. As it is well known, under the strict application o its axioms, quantum chemistry misses about 2% of molecular binding energy. To get the missing balance, orthodox chemists use "shielded Coulomb interactions" and then claim for evident political gains to still have a quantum theory in full knowledge that shielded Coulomb potential do not permit quanta of energy, or that they can only be obtained from the Coulomb potential via nonunitary transforms, thus existing the classes of equivalence of quantum chemistry!

Yet additional claims exist in the official chemistry literature under DOE and NSF support with the statement that quantum chemistry is exactly verified by the experimental fit of variational methods with a plethora off unknown parameters, in full knowledge that their solutions can be easily proved not to be the solution of the unadulterated Schroedinger equation. As an example among too many for comfort, the Schroedinger equation for the H2+ ion notoriously miss 2% of the binding energy, while variational method with a plethora of unknown parameters does indeed achieve its exact representation. But then a graduate student can prove that the wavefunctions of the two approaches are structurally inequivalent.

Above all, the missing 2% of binding energies corresponds to 950 kcal/mole while the reaction of hydrogen and oxygen into water produces 57 kcal/mole. Therefore, any thermochemical calculations based on quantum chemistry implies the incredible error of twenty times the value to be studied!

Therefore, the scientific reality outside politics for personal gains establishes that the exact fit achieved via nonunitary maps of the Coulomb potential or variational methods with a plethora of unknown parameters, and the like, constitute concrete evidence of the limitations of quantum axioms and the need to construct a covering chemistry admitting the indicated exact representations from first principles without any adulteration, a task which has already been accomplished (see the outline below).

Quantum superconductivity is completely unable to provide a quantitative representation of the very essence of its discipline, the structure of ONE Cooper pair (identical electrons bonded in singlet coupling so strongly that they even tunnel in a bonded fashion through a potential barrier). This is due to the Coulomb repulsion between the identical electrons which diverges at small distances and several other reasons. Any claim of representation of the Cooper pair constitute sheer scientific corruption because, as well known, quantum superconductivity can only represent an ENSEMBLE of Cooper pair assumed as STRUCTURELESS POINTS. Lack the representation of the very hearth of superconductivity renders any belief on the terminal character of quantum mechanics in superconductivity an addition case of sheer scientific corruption for personal gains.

Shall I keep going in listing the inconsistencies of old doctrines?

HADRONIC MECHANICS, SUPERCONDUCTIVITY AND CHEMISTRY. The conception of hadronic reactors fir required the laborious construction of a structural lifting of the Minkowskian geometry [3a], the rotation-Lorentz Poincare' symmetry [3b] and special relativity [3c] for interior conditions, while admitting special relativity as a particular case when motion returns to be in vacuum. This body of knowledge is today known in nonpolitical scientif circles as "Santilli's isospecial relativity," from which all other covering theories and related new energies follows via compatibility arguments.

The new reactors also required the generalization of quantum mechanics I proposed in 1978 under the indicated DOE contract under the name of hadronic mechanics, for the operator treatment of extended, deformable and nonspherical particles moving within physical media, under the condition of admitting quantum mechanics identically for sufficiently large distances (see the latest accounts [4]).

Upon the achievement of sufficient maturity in the latter theory in the mid 1990s thanks to contributions from numerous mathematicians, theoreticians and experimentalists, hadronic reactors required the construction and verification of hadronic superconductivity which was achieved in the mid 1990' [5].

Upon the achievement of the latter broader theories, hadronic reactors required the additional construction of a structural generalization of quantum chemistry under the name of hadronic chemistry which only applies at the small distances of valence bonds, while admitting conventional quantum chemistry everywhere else [6].

This laborious scientific iterim illustrates the reason why the construction of a first reactor predicted by hadronic mechanics could only be done at Toups Technology Licensing, Inc., only twenty years following the initial DOE gran of 1978.

It should be noted that all these theories have been constructed along the teaching by Einstein, Podolsky and Rosen on the "lack of completion of quantum mechanics." In fact, the new hadronic theories essentially "complete" conventional relativities, mechanics and chemistry via missing terms at short distances of nonlinear, nonlocal, and nonpotential typ due to deep wave-overlappings of particles. the "completion" is done in such a way to yield a concrete and explicit realization of "hidden variables", and implies a lifting of Bell's inequality which,. contrary to popular belief, does indeed admit a classical counterpart (see [7] for technical details).

I learned from my undergraduate studies in physics that there cannot be a really new physical theory without a really new mathematics, and there cannot be a really new mathematics without really new numbers. For this reason, I dedicated, by far, the majority of my time to the search of new numbers and new mathematical structures, on which t construct subsequently new physical theories.

Such a research line was mandatory for my DOE grants because one of their primary objective was a study of the historical legacy on the nonlocality of the strong and other short range interactions. In turn, nonlocality implies the inapplicability of the very foundations of special relativity, quantum mechanics and chemistry, let alone their physica axioms, because of the collapse of the basic topology and all related mathematical constructions.

Following a laborious process of trial and error, I identified three types of new numbers, today called "Santilli's iso-, geno- and hyper-numbers" for the study of matters, with additional classes of new numbers for the study of antimatte known as "Santilli's isodual numbers" characterized by generalized units which are respectively: positive-definite, nonsymmetric, multivalued and negative-definite. On these generalized numbers I then constructed corresponding new spaces, topologies, algebras, geometries, differential calculus, etc. resulting ion what are today known as iso-, geno-, hyper-mathematics and their isoduals (see the special issue of a mathematical journal [8].

Thanks to the new mathematics, I then constructed progressive generalizations of special relativity, quantum mechanics, superconductivity and chemistry also of isotopic, genotopic, and hyperstructural type for the representatio of particles in conditions of progressive complexity (reversible, irreversible and multivalued interactions of nonlinear nonlocal and nonpotential type) [4], plus corresponding isodual theories for the study of antiparticles beginning at the classical level, and then continuing all the way to second quantization (where isodual theories become equivalent to charge conjugation) [9b].

It should be note that the isodual theory of antimatter resolve one of the biggest unbalance of the physics of the 20th century, that is, the treatment of matter at all possible levels from Newton to second quantization, while antimatter w solely treated at the final level of second quantization. The isodual theory predicts the existence of antigravity for antimatter in the field of matter (or viceversa) and in a form which bypasses all existing objections (trivially, because they do not apply to a theory whose basic unit is negative) [9a].

The fundamental prediction of antigravity is indeed testable with current technology by injecting a very low energy beam of electron and another of positrons in a collimated horizontal vacuum tube of 100 m in length and 1 m in diameter [9], in which case the displacement due to gravity on a scintillator at the end of the tunnel, whether up or down, is visible by the naked eye, thus being resolutory. This test is strongly recommended to our governmental agencies because the possible discovery of antigravity would imply advances beyond our imagination, such as a new form of "geometric propulsion" (motion of objects via changes in the local geometry without any visible external force), a causal space-time machine (although restricted to isoselfdual states), and other far reaching advances.

The isodual theory of antimatter moreover predicts a new photon, I have called isodual photon [9b], which is differen than that emitted by matter. If verified experimentally, isodual photons will one day permit scientific studies whether far away galaxy is made up of matter or of antimatter. This feature is structurally impossible for Einstein gravitation where any treatment of antimatter is afflicted by catastrophic inconsistencies, such as the impossibility to reach antis articles following quantization (inconsistencies resolved by the isodual theory via the new isodual-antiisomorphic quantization precisely into antiparticles).

My studies have then culminated with the achievement of a grand-unification incorporating all existing interactions, in

which gravity is embedded in the unity of conventional unified gauge theories of electroweak interactions [10]. This appears to be my most important contributions which includes all preceding results and predictions, including the new hadronic energy, as a particular case.

I should finally mention that the representation of nonhamiltonian forces via generalized unit is the only known which is invariant (that is, predicts the same numbers for the same quantity under the same conditions at different times), evidently because, whether generalized or not, the unit is the basic invariant of all theories.

Practical applications of all the above new theories can today be easily constructed via simple noncanonical transforms at the classical level and nonunitary transforms at the operator level, e.g.,äIÎ?[t, r, v, ¥, ^¥, ...]U¤I?UÊ = 1_T?, where U?UÊ is everywhere 1 except at short distances [(o recover quantum mechanics at large distances); A?BA??B = U?[A?B]?UÊ = A??T??A?, A? = U?AÊ;H?|¥> Ê?¥> äU?[H?|¥>] = U?[Ê?|] = H???|¥?> Ÿ?|Ê?>¥?|> = U?¥?>; etc. where the nonunitary transform can be positive-definite (isotopy), nonsymmetric (genotopies), multivalued (hypertheories) or negative-definite (isodual theories).

Similarly, arbitrary local speeds of light are easily obtained via the nonunitary transform of the Minkowskian line element m = diag. [1, 1, 1ç2] ä m? = U?m??UÊ = diag. [1, 1, 1ç2_n2]. However, to have a meaningful theory, the unit my be jointly lifted by the inverse form I = diag. [1, 1, 1, 1]?ä= [1, 1, 1, n2] as a necessary condition for invariance (see the quoted literature).

MAIN IMPLICATIONS OF HADRONIC THEORIES FOR NEW ENERGIES. A feature of hadronic mechanics which is important for new clean energies is that nonpotential interactions due to deep wave overlappings of particles in singlet coupling (represented via the indicated nonunitary maps) have resulted to be so "strongly" attractive to overcome possible repulsive Coulomb forces.

This feature has permitted new structure models of hadrons, nuclei and molecules in which their binding are only partially due to potential energies because interior problems within hyperdense media imply the presence of nonpotential forces of contact type (similar to those experienced by the space shuttle during reentry in atmosphere). In particular, the new interactions have zero range by conception, thus being beyond quantum mechanics, trivially, because the latter is strictly Hamiltonian, thus solely representing action-at-a-distance interactions. By comparison, hadronic mechanics does permit quantitative studies of contact, zero-range, nonpotential interactions via their representation with generalized units which assure invariance of the treatment.

An important illustration of the new forces is given by Pauli's exclusion principle which is strictly assumed by quantum mechanics without any explanation whatever. In fact, any attempt at explaining Pauli's principle with quantum mechanics can only be done by adding a potential to the Hamiltonian, resulting in dramatic divergences from experimental data, e.g., in spectral emission. These departures confirm that the interactions underlying Pauli's principle cannot be represented with any potential. Hadronic mechanics has instead provided a quantitative and numerical representation of Pauli's exclusion principle in particle physics, nuclear, physics and molecular structures.

The treatment via hadronic mechanics of contact, zero-range, nonpotential contributions in bound states has permitted the identification of "triggers" capable of the most efficient possible disintegration or creation of bound states, in way compatible with all usual total conservation laws. The combination of all research done in two decades has lead to the identification of the following classes of new clean energies (see the memoir RMS, J. New Energy, 4, # 1, 7-318, 1998):

Hadronic energies of Class I (those at the particle level) [11]. A representative case is given by the possibility of utilizing the energy in the structure of the neutron. This energy is evidently unlimited, it is very large (a neutron emit electrons with energy about 100,000 that of the electrons hitting a computer screen), and it is very clean because the neutron's decay emits an electron, which can be easily stopped with a thin metal shield, and the innocuous neutrinos. Moreover, neutrons are not stable, have a variable meanlife depending on the nuclear conditions considered (varying from nanosecond in certain nuclei to infinite stability in others), and decay spontaneously. Hadronic mechanics has identified "triggers" for the Stimulated Neutron Decay (SND) one of which is given by a hard photon with energy of

1.294 MeV.

By no means all nuclei permit the stimulated decay of their peripheral neutrons. Hoverer hadronic mechanics has identified a class of light, natural, stable isotopes, called "hadronic fuel" which do admit the SNT in conformity with al known total conservation laws, such as Zn(30, 70), Mo (42, 100) and many more which are called "hadronic fuel." Under the indicated "trigger", all hadronic fuels admit a double beta decay, the first stimulated and the second spontaneous, e.g. of the type © ? + 42Mo100 ä 43Tc100 + *-, 43Tc100 ä 44Ru100 + * with the release of several MeV of energy, thus resulting in a transparent energy yield.

Note the prediction of the stimulated transition from a light, natural, stable element to another element which is also light, natural and stable, although with lower energy. The resulting hadronic energy is clean because of the lack of harmful radiations, as well as the lack of harmful residues. The energy produced is twofold, the first being the possib creation of difference of electric potential between the hadronic fuel ad the metal shield (the "hadronic battery"), and the second being heat acquired by the shield itself.

The above hadronic energy has been subjected to a first preliminary experimental verification at the nuclear physic laboratory in Xhanti, Greece. The test was conducted via the use of a Europa isotope as a source of the needed photo with 1.3 MeV, which source was placed next to a Mo disk. The emitted electrons were measured via a conventional oscilloscope. Comparison of several tests for the background, the Europa source alone, and the Europa source combined with the molybdenum target show in the latter case the clear appearance of electrons with energy over 2 MeV which can only be interpreted as originating from the stimulated beta transition of the molybdenum (since the upper energy limit of atomic electrons from Compton scattering is 1 MeV).

It should be indicated that the experimenters in Xhanti used a commercially available molybdenum which contains the isotope Mo(42, 100) only as 0.6%, while all other isotopes can be easily proved not to admit the SNT because of the violation of one or another law. Despite the low percentage of the only acceptable isotope, it was remarkable that electrons of nuclear origin were indeed systematically detected.

It is evident that the above tests need independent confirmation. One of the best can be conducted at ORNL synchrotron which is capable of producing the sharp resonating frequency of 1.294 MeV, as well as produce the need "hadronic fuel."

It should be indicated that the above hadronic energy is impossible for Einsteinian doctrines and quantum mechanics. This is so for various reasons, e.g., the symmetries underlying special relativity do not permit the alteration of the intrinsic characteristics of particles such as the neutron's meanlife; quantum mechanics predicts that the cross section between photons and neutrons is so small to have no practical significance; quarks cannot be excited with the indicate "trigger"; and so on.

All these objections are readily resolved by isospecial relativity (which has been built precisely to represent the "mutation" of the intrinsic characteristics of particles when in interior conditions), by hadronic mechanics (whose isoscattering theory recovers the very low value of the ©-n cross section with the exception of a sharp peak at 1.294 Mev); by the new structure model of hadrons (in which quarks are composites of conventional massive particles, only in mutated conditions obeying hadronic mechanics due to the hyperdense medium in the interior of all hadrons); and on.

The central scientific issue here is the following: if Einstein's special relativity is manifestly inapplicable for interior physical conditions as simple as those in our atmosphere, the insistence that the same relativity is exactly valid in the interior of the hyperdense hadrons is sheer scientific corruption, this time in direct conflict with primary needs of America for new clean energies. At any rate, independently from the Xhanti experiment on hadronic energy, there ex a rather massive volume of experimental evidence for which special relativity cannot be exactly valid in the interior o hadrons (see the paper by Arestov et al.). Therefore, any continuation of the documented suppression of due scientific process on the inapplicability of Einsteinian doctrines within hadrons, which has been perpetrated by academia for about half a century in total impunity, constitutes a clear lack of scientific accountability, let alone ethics, in the use o

public money.

Hadronic energies of Class II (those at the nuclear level with contributions of new energies of Class I) [11]. Contemporary nuclear physics does not predict Low Energy Nuclear Transmutations (LENT) for a variety of reasons the most important being the Coulomb repulsion between nuclei at low energy. Hadronic mechanics has long resolved all these objections, by yielding the most rigorous, axiomatically consistent and invariant theory of LENT available today, which include the identification of their physical laws, geometries, and optimal embodiments. Intriguingly, the virtual entirety of the SNT permitted by hadronic mechanics are possible if and only if there is no secondary emission of neutrons or other harmful radiations.

These studies have permitted the prediction of a variety of hadronic energies of Class II. The most significant example are those which can be identified by simply observing (and admitting) physical evidence. Regrettably, the topic is too technical to be effectively outlined in a letter (see RMS, J. New Energy 4, # 1, 1998). Those I can outline conceptual are the following.

A first group of hadronic energies of Class II can be conceived from the evidence that neutrons are synthesized in nature from protons and electrons, as originally conceived by Rutherford via "compressed hydrogen atoms" in the interior of stars. A number of hadronic energies of Class II can then be predicted via the use of the inverse of the stimulated decay of the neutron considered above, namely, the synthesis of the neutron from peripheral nuclear proto electrons, as well as the necessary "trigger." For technical reasons, these processes are also sharp, in the sense that the are generally impossible, except when the electrons have exactly the needed threshold energy, and this explains why they have not been detected so far. Again, hadronic mechanics recovers the prediction of quantum mechanics that the SNT are impossible for all electron energies except for the sharp threshold energy.

A second group of new, clean, hadronic energies of Class II can be predicted by observing our Earth which, due to th known large rate of dissipation of heat in space, should have been completely frozen in its core hundred of millions o years ago. Once academic interests for personal gains are put aside, the only plausible explanation of the immense internal volcanic activity of hearth (including apparent geophysical evidence that Earth is expanding), is that the internal heat in our planet is due to low energy nuclear transmutations. The magnetic character of its core then permi the conception of a variety of new energies of Class II. One of them is a study of the energy release of hydrogen on palladium via electrolytical means as experimentally measured since the early 1930s. These studies are not conducted according to the research popularly known as "cold fusion," but rather according to systematic and in depth research conducted via hadronic mechanics.

Recall that the palladium in its natural state includes a large number of isotopes. Hadronic mechanics has proved that most of them cannot admit any SNT, while certain isotopes (Pd(46, 105), Pd(46, 106) and Pd(46, 108) only) do admi them. The use of palladium in its natural state in the ongoing research in the field can explain, alone, the very low energy output. Once the admissible palladium isotopes have bene identified, the appropriate use of magnetic fields permits the verification of all needed conservation laws, particularly those for conservation of spin-parity. Since the latter are not taken into account in current experiments, this provides a second reason for the low energy yield. The n energies of Class II are finally completed by the identification of the appropriate use of magnetic fields and "triggers" permitting protons or deuteron to enter into the "hadronic horizon" around the palladium nuclei (that in which hadronic mechanics and related forces take over quantum mechanics).

A third group of hadronic energies of Class II can be derived from the historical evidence on the increase of nitrogen percentage in our atmosphere. The study of bubbles of atmosphere contained in amber has shown its nitrogen content to be one hundred million years about 50% of the current value. These measures have established the existence of a mechanism in our planet which synthesizes nitrogen. In fact, the astrophysical origin in the increase of nitrogen must excluded since the increase has been progressive (besides, "nitrogen comets" do not exist) and the volcanic origin can also be excluded because of insufficient emission of nitrogen. Again, when academic postures for personal gains are s aside, the most plausible mechanism for the synthesis of nitrogen in our atmosphere is lighting, which can synthesize (7, 14) from C(6, 12) and H(1, 2) plus the "trigger", also under the necessary condition that the SNT implies no secondary radiation. The low percentage of H(1, 2) in water explains the low rate of the synthesis of nitrogen.

Besides the historical evidence on the increase of nitrogen in our planet, the best plausibility for the hadronic nitrogen reactor is given by thunder, which can be easily proved not to be explainable via ordinary processes, because of the need of a large amount of energy in an extremely small volume and time. A scientific (that is numerical) explanation thunder can only be reached by admitting SNTs. The synthesis of nitrogen is then the best candidate, with the understanding that there are also others (see loc. cit.).

Hadronic mechanics has identified all the necessary conditions for the above synthesis of the nitrogen, as well as all th necessary geometries, and the possible trigger," resulting in the proposal of a "hadronic nitrogen reactor" whose test is strongly recommended to the DOE because it can indeed contribute to the achievement of new clean source of primar energy for the production of electricity. In fact, as it is the case for all hadronic energies of Class II, the energy outpu large indeed. For instance, assuming the efficiency of one reaction per 1010 molecules, a reactor of the size of a suitcase can produce 106 joules/minute. Suppress such a possibility just to serve equivocal organized interests in academia would be profoundly anti-American!

Hadronic Energies of Class III (those at the molecular level with possible contributions of new energies of Classes II and I) [11]. These later energies are, by far, the most complex because they require the entirety of the scientific knowledge herein referred to, including particle physics, nuclear physics, chemistry, superconductivity and other disciplines. Yet, the hadronic reactors for the production of magnegas are no dream. They exist indeed, and are available now.

No technical outline is possible in this letter due to the excessive number of aspects. An indication of a few aspects m however be useful to illustrate the central motivation of this letter, that the proposed BEPR Program, if properly fund and supported, can indeed promote large technological advances beyond the doctrines of the past millennium.

Experimental evidence indicates that the electric energy needed for the separation of water via an electric arc is a fraction of that predicted by quantum mechanics and chemistry (the predicted value is about 1/3 of the experimental value). This divergence is readily understood by hadronic superconductivity. In normal conditions water is an excelle insulator, however, under the electric arc water becomes the best superconductor I know, with resistance dropping to fractional Ohms, under the condition that the arc is mostly formed by electron pairs bonded in singlet, as requested b the Santilli-Shillady isochemical model of the water molecule. If properly supported, these studies can lead to a new conception of electric current, that which isd made up mostly of bonded electron pairs, rather than individual electron The gain in superconductivity si then obvious and due to the lack of appreciable magnetic moment of the singlet electron pairs.

A second experimental evidence is that the heat produced by the magnegas reactors is about 1/3 of that predicted by quantum mechanics and chemistry. This can only be explained by the fact that only same of the predicted chemical reactions occur in the reactor. In turn, this is evidence that magnegas is composed also of isolated atoms, besides ordinary molecules, as predicted by the new chemical species of magnecules and independently verified via GC-MS/IRD tests. It is evident that systematic studies of this occurrence can lead to basically new chemical compounds with features beyond our predictive capacity at this time, some of which are already under tests.

Additional experimental evidence establishes that the energy content of magnegas produced from crude oil is at least three times the value predicted by quantum mechanics and chemistry. This is due to the novel capability of magnegas to store energy at three different levels: clusters of atoms and molecules into magnecules; conventional chemical reactions; and new means of storing energy in the interior of conventional molecules via new nonvalence bonds. It is evident that studies dealing with basically novel, large increase of energy storage in fuels have direct relevance for ou Country, beginning with military relevance.

All other topics treated in the proposed BEPR Program have equal, far reaching implications of truly momentous advances in our technology and basic knowledge.

CONCLUDING REMARKS. When working within an academic environment everything goes because of the guaranteed impunity enjoyed for over half a century on possible misuses of public funds. Well documented cases are

the thousands of papers published in the deformations AB qBA without any quotation of my origination as part of my Ph.D. studies in 1967 of the broader class pAB-qBA [12] as well as without the quotation of the American mathematician A. A. Albert in regard to the underlying Lie admissible structure. Since these omissions are intentional and done in full documented knowledge of the editors and most authors, they constitute a violation of the Statutes on Copyrights, Tort, etc. of our Civil Code. Another well documented case is the widespread publication of physics pap on nonunitary theories treated with conventional mathematics in documented knowledge by all editors and most authors of their catastrophic inconsistencies [12], thus perpetrating, this time, a violation of the Criminal Code (becau consisting of an intentional organized deception in publications released to the American public). Another well documented case perpetrated throughout the entire 20-th century is the continued publication of papers on Einstein gravitation without any resolution or even quotation of its plethora of inconsistencies published in refereed technical journal, which constitutes without doubt the biggest disgrace of America's science of the 20-th century (Einstein's gravity has a noncanonical structure at the classical level and a nonunitary structure at the operator level thus lacking invariant units of measurements, observable and other foundations to qualify as a physical theory [12], to mention on a few out of a river of inconsistencies).

However, when working in an industrial environment, as I do, a physicist becomes personally accountable for the money receive from the stockholders. In the latter case the conduction of research on really new energies via the use quantum mechanics superconductivity and chemistry becomes a potential violation of the Criminal Code, e.g., when throwing calculations on thermochemical processes via quantum chemistry in which the error is twenty time the value to study.

For the U. S. Department of Energy and the National Science Foundations to really serve the interest of our Country is essential that they set corporate, and not academic standards.

Another well known occurrence is that the US Military were forced to cut all ties with academic research back in the early 1970s because the security of our Country could not be put hostage to pet theories preferred by the professor at Harvard, MIT, Princeton and similar places. Any person with a minimum of dignity admits that the research now goi on in the military, e.g., at Sandia Laboratories, are immensely more advanced than those going on at Harvard, MIT, Princeton and similar places, trivially, because the former were unobstructed by scientific politics, while the latter ha been severely constrained.

To really serve the interests America it is now the time for the DOE and NSF to do what the US Military did three decades ago: cut out of the decision process corrupt academicians which constitute a threat to basic national interests.

The episode of the "cold fusion" should be remembered here to prevent its repetition. As it is well known, Pons and Fleishmann announcement of apparent low energy nuclear transmutations were attacked by academia as fraud. As an example, Herman Feshbach from MIT volunteered to appear at CNN and denounce cold fusion as a fraud. The point that the research by Pons and Fleishmann were primarily funded, scholarly presented and remain plausible to this day By comparison, Herman Feshbach was supporting the appropriation by MIT of huge public funds for the "hot fusion", namely, for a process which had been rigorously proved to be impossible decades ago. Everybody can then judge where the fraud lies.

The damage suffered by America because of this type of academic corruption are today known to all. Pons is the only American I know who renounced his U. S. Citizenship; governmental officers conducted a crusade at the US Patent Office to prevent the issuance of new patents to prevent damage to academic friends; several new potential industrial developments were in this way suffocated at birth; and, as a bottom line, the basic needs for new clean energies remained totally unsolved.

Our beautiful Country is heading toward potentially catastrophic environmental problems, very serious foreign politic problems, and an economy which could potentially collapse in the events of lack of containment of these problems. T very survival of America depends on the capability of all governmental officers to really serve the interests of our Country, rather than serving equivocal academic interests.

Let us not not forget the teaching by history: the Roman empire initiate its collapse at the very peak of its power precisely because the people in governmental suppressed ethical, political, and economic accountability for their personal gains.

If there is any thing I can do to assist DOE or NSF in implementing new programs in the real interest of science, as well as of America and its allies, you can count on my unconditional support.

Yours, Truly

Ruggero Maria Santilli
President
The Institute for Basic Research

RMS-pf

Copy to Dr. Peter Rosen, Director, DOE High Energy Physics Research, as representative of academia which has supported until now the preservation of old theories.

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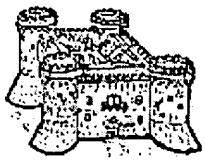
First updated July 18th, 1999. Revised July 30th, 2001



INSTITUTE FOR BASIC RESEARCH

APPLICATION OF HADRONIC MECHANICS, SUPERCONDUCTIVITY AND CHEMISTRY TO NEW CLEAN FUELS AND ENERGIES (cont'd)

Prepared by the IBR staff

The nontechnical presentation below was written in 1999. As of today (January 2003) the best technical presentation on hadronic mechanics and chemistry is available in the monograph
R. M. Santilli,
FOUNDATIONS OF HADRONIC CHEMISTRY
WITH APPLICATIONS TO NEW CLEAN ENERGIES AND FUELS,"
Kluwer Academic Publisher
Dordrecht-Boston-London
December 2001
ISBN 1-4020-0087-1
Order by e-mail at Kluwer Academic Publishers.

An 83 pages memoir on the foundations of hadronic mechanics and chemistry can be printed out from the pdf file
<R. M. Santilli
ISO-, GENO-, HYPER-MECHANICS FOR MATTER, THEIR ISODUALS, FOR ANTIMATTER, AND THEIR NOVEL APPLICATIONS IN PHYSICS, CHEMISTRY AND BIOLOGY, >
in press at the *Journal of Dynamical Systems and Geometric Theories.*

Additional technical presentations are available in Scientific Works

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PART 3: THE SCIENTIFIC RESEARCH UNDERLYING THE MAGNEGAS TECHNBOLOGY

3.1. HADRONIC MECHANICS

3.1.A. FOREWORD

In Page 19 of this Web Site we have outline hadronic mechanics as known in the early 1990's, and without referenceo new clean fuels and energies. A 314 pages update of hadronic mechanics as of 1999, specifically written to identify th physics of new clean fuels and energies, has been recently published in Ref. [1] at the end of this page. A revised, expanded, and updated presentation is currently in print for distribution in January 2,000 as the monograph, see Ref. [2]. An outline of this monograph is important for an understanding of the new clean, ovemnity, fuels and energies.

3.1.B. GENERAL OUTLINE

The monograph reports in a language accessible to the general scientific audience systematic research on new energie and fuels conducted at the particle, nuclear, and molecular levels, that I initiated at Harvard University in 1978 under DOE contracts ER-78-S-02-47420.A000, AS02-78ER04742, DE-ACO2-80ER10651. Santilli then continued the research in collaboration with several mathematicians, theoreticians, experimentalists, solid state physicists, chemists and biologists at The Institute for Basic Research (then in Cambridge, Massachusetts) and at various other institutions under DOE contracts DEACO2-80ER-10651.A001, and DE-ACO2-80ER10651.A002. Subsequently, the research wa continued under financial support by Hadronic Press, Inc., then in Nonantum, Massachusetts. More recently, the research was completed under logistic and financial support by Toups Technology Licensing, a public company in Largo, Florida. Far from being a presentation of vague academic character, and as stated beginning with Part I, the primary objective of the monograph is strictly pragmatical-concreteindustrial. It consists in the use of hadronic mechanics for the identification of the physical laws, geometries, and conditions under which new clean energies and fuels are possible, and the recommendation of concrete and specific embodiments, called [3]Hadronic Reactors for the best possible realization of said laws, geometries, and conditions. For that purpose, the monograph classifies the reactors into three separate types: Hadronic Reactors of Class I, that are solely based on new effects in the interior of

hadrons; Hadronic Reactors of Class II, that are based on new effects in the structure of nuclei with possible contributions from Class I; and Hadronic Reactors of Class III, that are based on new effects at the atomic-molecular structures, with possible contributions of Classes I and II. Numerous Hadronic Reactors under Patent Pending are the outlined. The reactors are solely possible under the validity of hadronic mechanics, and, more particularly, under new structure models of hadrons, nuclei, and molecules, permitted by hadronic mechanics and outlined in Part III, IV and respectively, jointly with available experimental verifications. As an illustration, the assumption that three quarks are the constituents of the neutron prohibits any possible utilization of the energy released in its decay, trivially, because the quarks must be confined. On the contrary, the assumption that the physical constituents of the neutrons are one proton and one electron as originally conceived by Rutherford (which model is prohibited by quantum mechanics, yet fully admitted by hadronic mechanics), does indeed permits the utilization of the clean energy of Class I contained in the neutron, because the emission of the structural electron can be stimulated. A similar, mutually exclusive situation occurs between the reactors of Classes II and III and the conventional quantum models of nuclear and molecular structures. Toups Technology Licensing had a crucial role in the completion of the research presented in the monograph, by conducting fundamental anomalous measurements outlined in Part V. These measurements permitted the successful construction of the the first Hadronic Reactor of Class III that has resulted to be over-unity of 2.78 according to the independent certification by Motorfuelers, Inc., a Florida testing laboratory, in its first prototype version (see Section II in this web page).

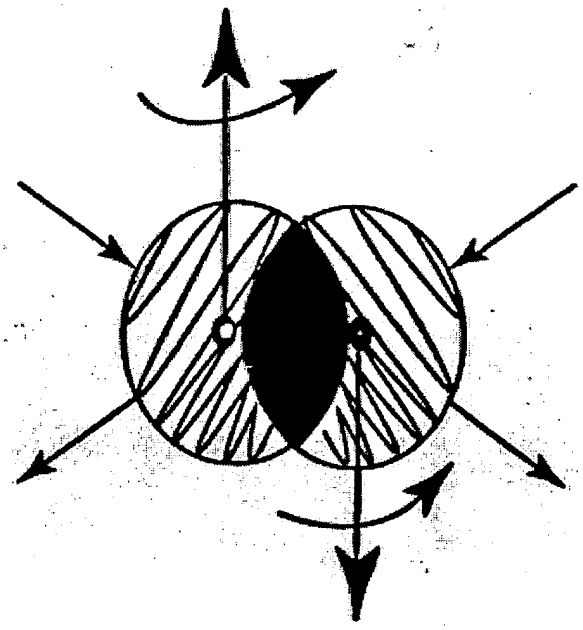


FIGURE 3.1: A schematic view of the fundamental process studied by hadronic mechanics, the interactions of particles under conditions of deep mutual penetration-overlapping of their wavepackets or charge distributions. These interactions are expected to be: 1) nonlinear in the wavefunctions (because of the lack of separability of the states); 2) nonlocal-integral (because defined over a finite volume NOT reducible to a finite set of isolated points); and 3) nonpotential-nonhamiltonian (because of contact, zero-range type for which the notions of potential and hamiltonians have no meaning of any type). Therefore, the interactions of this figure are dramatically beyond any hope of scientific-quantitative study via quantum mechanics (due to its strictly linear, local, and hamiltonian character), thus mandating the construction of a covering mechanics. Note also that the interactions of this figure hold particularly fo point-like charges, such as for the electrons. In fact, the interactions originate from the extended character of wavepackets or charge distributions and, as such, they have no connection with point charges, or other electric effect. Santilli's main assumption of 1978, tha is at the foundations of hadronic mechanics, is to represent nonlinear, nonlocal and nonhamiltonian interactions via a nonsingular generalization of the basic unit of the theory,

1 ->I*(t, r, v phi, ...) = 1/T(t, r, v, psi, ...),

and reconstruct the mathematical structure of the theory in such a way to admit the generalized unit as the correct left and right unit. Via mere compatibility arguments one then obtains the Santilli's iso-Heisenberg equations

i dA/dt =[A, H]* = ATHHTA
[r, p]* = rTp - pTr = i I*,

and the Mignani-Myung-Santilli iso-Schroedinger equations

$$HT|> = E|>$$
$$pT|> = - iI^*D|>$$

The reason for selecting a generalized unit is that any other representation of nonlinear, nonlocal and nonhamiltonian interactions is known to be NON-invariant under the time evolution of the theory, or having other catastrophic inconsistencies (page 19), thus having no physical value of any type. By comparison, the unit is the fundamental invariant of any theory, thus assuring the invariance of the numerical results, again, when the mathematical elaboration of the theory is properly lifted. The lifting of the unit then allows three new mathematical and related physical formulations, called iso-, geno-, and hyper-theories (page 18), depending on whether the generalized unit is single-valued hermitean, single-valued nonhermitean and multiple-valued nonhermitean. These theories are used for the representation of closed-conservative reversible systems (such as hadrons, nuclei, and molecules), open-nonconservative irreversible systems (such as open particle, nuclear, and chemical reactions), and multivalued irreversible systems (such as biological structures). Hadronic mechanics represents antimatter is via an anti-isomorphic map called isoduality, that is applicable at all levels, beginning at the Newtonian level, and then ending at the particle level, where it is equivalent to charge conjugation. An important discovery of hadronic mechanics at the foundations of new clean fuels, and energies is thathe deep overlapping of the wavepackets or charge distributions of particles, when in singlet couplings (antiparallel spins), implies an attraction so strong to overcome possible repulsive Coulomb forces, thus resulting on new bonds simply not predictable by quantum mechanics, as experimentally verified for the deep correlation-bonding of the two electrons of the helium, the two electrons of the Cooper pair, the electrons in ball lighting, an other events. A main feature of hadronic mechanics is the representation of the capability of particles with the same charge to form bound states at short distances. In turn, these new bonds have permitted the construction of new structure models of hadrons, nuclei, and molecules outlined in Ref. [1], that are at the foundations of Santilli PlasmaArcFlow Reactors, as well as of the new fuels and energies outlined in this page.

3.1.C. PART I: INSUFFICIENCIES OF QUANTUM MECHANICS

This first part begins with the statement of objectives of the series: the identification of the basic physical laws and related technological realizations of energies and fuels, that: are new, in the sense that they cannot be predicted and treated via quantum mechanics; are clean, in the sense that they do not produce radiations, waste, or exhausts harmfu to humans and the environment; and are real, in the sense that they are realizable with current technologies in a way having practical, thus industrial and consumer value. Part I then provides a systematic presentation of the limitations quantum mechanics in particle physics, nuclear physics, superconductivity, chemistry, biology, gravitation, astrophysics, and cosmology. These limitations are a necessary prerequisite for the presentation of a generalization (also called covering) of quantum mechanics known as hadronic mechanics, that outlined in the subsequent parts. It is stressed that, by no means, the series seeks violations of quantum mechanics, but merely the identification of novel, generally non-Hamiltonian conditions and effects at short distances under which the theory is inapplicable, because no constructed for these new scopes.

3.1.D. PART II: THE NEW MECHANICS

Part II is devoted to the outline of the covering mechanics used in these studies, hadronic mechanics, originally proposed by Santilli in 1978 jointly with its basic equations and related new mathematics. Hadronic mechanics was subsequently developed by numerous mathematicians, theoreticians, and experimentalists, and has now reached operational maturity for applications in the industry. Part II begins with a review of the catastrophic inconsistencies suffered by all generalized theories with a nonlinear, nonlocal or nonunitary structure, due to their lack of invariance with consequential need of new mathematics for their invariant representation. Part II then outlines three, progressive generalized, new mathematics called iso-, geno- and hyper-mathematics, that have been constructed for the invariant treatment of nonlinear, nonlocal, and nonunitary theories representing closed-isolated-reversible systems, open-nonconservative-irreversible systems, and multi-valued-irreversible systems, respectively. The fundamental assumption of all these mathematics and mechanics is the generalization of the unity, from its trivial value +1 dating back to biblical times, to a positive-definite, but otherwise arbitrary function, matrix, or integro-differential operator. The entire mathematics and mechanics are then reconstructed to admit such a generalized units at all levels,. with no exception (avoid the catastrophic inconsistencies indicated earlier). All characteristics, interactions and effects outside quantum mechanics (that is, not representable with a Hamiltonian) are represented with the above generalized unit, that, being the fundamental invariant of the theory, does indeed permit the achievement of an invariant, axiomatically consistent formulation of nonlinear, nonlocal and nonunitary effects. as expected in deep overlapping of the wavepackets of particles. Part II then presents an outline of the nonrelativistic and relativistic, iso-, geno-, and hyper-mechanics, with particular emphasis to: 1) The identity of quantum and hadronic mechanics at the abstract, realization free level; 2) T verification by isomechanics of all conventional quantum laws, such as Heisenberg's uncertainties, Pauli's exclusion

principle, causality, etc., only expressed via a broader formalism; and 3) A very simple method for the construction o concrete hadronic models accessible to all, thjat consist of simple nonunitary transforms of quantum models. Part II includes a detailed proof of the direct universality of hadronic mechanics, that consists, on mathematical grounds, of s formulation over the most general known numbers and fields, the iso-geno-, and hyper-octonions (that is, numbers defined with respect to a generalized Hermitean, nonhermitean and nonhermitean multivalued unit). The physical counterpart of the above direct universality is the capability by hadronic mechanics to admit in an axiomatically consistent and invariant way of all infinitely-possible, nonlinear, nonlocal, and nonunitary theories (universality), directly in the frame of the experimenter (direct universality). Readers should be aware that a technical understanding of this direct universality requires a technical knowledge of the catastrophic inconsistencies of conventional generalize theories and their resolution via the new mathematics. particular emphasis is given in this Part II to the identification Santilli's iso-, geno- and hyper-special relativities, including the directly universal liftings of the underlying Minkowskian geometry, the Lorentz-Poincare'-symmetry, and the physical axioms. The fundamental representation is the locally varying character of the speed of light within physical media, as established in our environment (such as th refraction of light). As shown in subsequent parts, the deviations from the speed of light in vacuum, and the invariant representation via Santilli's isospecial relativity, are at the foundation of all new clean energies and fuels studied in ths monograph, and their realization via Hadronic Reactors. Experimental verifications of hadronic mechanics and relate new relativities in particle physics, nuclear physics, chemistry and other fields are presented in Parts III, IV and V, respectively. These studies imply the clear identification beyond credible doubts of Conte's plagiarism of the basic concepts, laws, and equations of hadronic mechanics and the plagiarism of Santilli's isospecial relativity, without the quotation of the specific papers of their origination, in Conte's documented knowledge of their existence.

3.1.E. PART III: STRUCTURE OF THE NEUTRON AND NEW ENERGIES OF CLASS I

Part III initiates the application of hadronic mechanics to new energies, beginning with the classification of the new energies into: Class I, when of particle origin; Class II, when of nuclear origin, with possible contributions of Class I and Class III, when of atomic-molecular origin, with possible contributions of Classes I and II. As a necessary pre requisite for the study of the new energies of Class I, this Part III outlines the rather numerous experimental verifications of hadronic mechanics in particle physics, astrophysics, gravitation, and cosmology. Part III then outline new structure models of unstable hadrons with physical constituents emitted in the spontaneous decays with the lowes mode, which models are strictly prohibited by quantum mechanics, yet readily possible with the covering hadronic mechanics thanks to the new nonlinear, nonlocal and nonunitary effects due to deep overlapping of the wavepackets o the hadronic constituents. The new structure models with ordinary physical constituents are at the foundation of new, clean energies of Class I. Particular attention is devoted to the first achievement by Santilli in 1990 of the representation, via hadronic mechanics, of all characteristics of the neutron as a bound state of one proton and one electron totally immersed in its interior according to Rutherford's historical legacy. The plagiarism by E. Conte in 199 of the main equations and results obtained nine years earlier without quotation of the original derivation (in Conte's documented awareness), is briefly indicated. Part III then reviews the first experimental verification of Rutherford conception of the neutron conducted by the late Italian priest-physicist don Borghi et al. A subsequent equivalent verification claimed by Conte et al. is indicated too, although with reservations due to the need of independent verifications following Conte's dismissal of the scientific priority by don Borghi et. al, with consequential loss of scientific credibility. Part III then presents an example of new energies of Class I, those based on the hypothesis first submitted by Santilli in 1994 that the neutron can be stimulated to decay, thus releasing the rather large energy of 1.2 MeV per decay. The related experimental verification by Gr. Tsagas et al. is also outlined. The resulting new knowledge is applied to new means for the recycling of highly radioactive nuclear waste, via its stimulated decay. Pa III concludes with the identification of the physical laws and conditions under which new energies of Class I are possible, and the proposal of various new experiments.

3.1.F. PART IV: STRUCTURE OF NUCLEI AND NEW ENERGIES OF CLASS II

Part IV is devoted to new energies of Class II, those originating at the nuclear level, and contains: 1) a more technica identification of the rather numerous limitations of quantum mechanics in nuclear physics; 2) evidence of the capabilit by hadronic mechanics of resolving said limitations; and 3) the achievement by hadronic mechanics of the first known exact-numerical representations of various nuclear experimental data, that are currently represented only in an approximate way; 4) a new structure model of nuclei composed by protons and electrons, that is strictly prohibited by quantum mechanics, yet fully permitted by the consistent treatment of Rutherford's conception of the neutron of the preceding Part III; and 5) various additional experimental verifications of the treatment of nuclear physics via the

covering hadronic mechanics. It is then shown that the emerging new structure model of nuclei does indeed permit th conception and treatment of new, clean energies of Class II (those occurring for totally ionized atoms), essentially based on stimulated nuclear transmutations without the emission of neutrons of other harmful radiations. The latter study begins with the identification of the physical laws, geometries and conditions of new energies of Class II, as predicted by hadronic mechanics. The study then concludes with the presentation of various Hadronic Reactors, that i specific and concrete embodiments suggested by hadronic mechanics, either for new energies, or for improving the efficiency of existing energies of nuclear type. Particular attention is provided to the origin of thunder. It is shown th thunder cannot be explained in a numerical-quantitative way via conventional chemical-physical means (e.g., the rapid displacement of an excessively minute volume of air), since its explanation requires the instantaneous availability of very large amount of energy (equivalent to hundred of tons of explosive). Evidence obtained via bubbles of air in amber is recalled, according to which our atmosphere contained only 50% of nitrogen about 100 million years ago, th establishing the existence in our planet of a process responsible for the increase of nitrogen to about 80%. After the exclusion of volcanic, asteroid, or other origin, lightning emerges as the most plausible process synthesizing nitrogen from carbon plus deuteron (or carbon plus protons and electrons). It is shown that the latter hypothesis does indeed permit a numerical;-quantitative explanation of thunder, because of the capability of releasing all the needed energy with a mere efficiency of one stimulated synthesis of nitrogen per ten billion molecules of air. The most important hadronic reactors of Class II are suggested via simple embodiments essentially inspired by lighting, that reproduce it within a liquid rich in deuteron and carbon, or within suitable gases. It is stressed that the stimulated nuclear transmutations here considered occur at about 5,000 C, thus being new, in the sense of have no connection to both, h and cold fusions. Therefore, hadronic mechanics has permitted the identification of a new class of nuclear reactions with new physical laws, and a probability of practical realization much greater than that of both, hot and cold fusions Other Hadronic Reactors are based on other processes all verifying the hadronic laws of Class II.

3.1.G: PART V: STRUCTURE OF MOLECULES, NEW, CLEAN, FUELS, AND NEW ENERGIES OF CLASS III

The study of new energies and fuels of Class V (those occurring at the atomic-molecular level with possible contributions of nuclear and particle type) requires the entire knowledge of the preceding four parts, plus new knowledge on molecular structure presented in this part. Part V begins with an outline of the rather serious environmental problems created by fossil fuels, that are only partially known to the public for evident political reason such as: 1) Largest production in our environment of carcinogenic substances via the combustion exhausts, at whose comparison the carcinogenic substances we ingest in food is quantitatively ignorable; 2) Oxygen depletion in our atmosphere at times below the minimum level required for proper heart function; 3) Green house effect due to excessive emission of carbon dioxide over the amount that can be processed by the depleting forests, and other seriou problems. Environmentalists are suggested to turn their efforts into scientific activities, that can only occur via the actual measurement of carcinogenic substances in our urban atmosphere, the actual measurement of local oxygen content, and the actual measurement of local carbon-dioxide. These measurements should then be compared with known standards, and the information should then be propagated to the public. The above unreassuring scenario re-affirms the need for new clean fuels, that is, fuels not permitted by quantum chemistry by their very definition (Part I Part V then passes to the outline of: the rather serious insufficiencies of quantum molecular models; a new model of molecules permitted by hadronic covering of quantum chemistry recently constructed by RR. M. Santilli and D. D. Shillady, which resolves said inconsistencies; and achieves the first representation of molecular characteristics exact to the seventh digit (while quantum chemistry misses about to 2%). Part V then reviews the new chemical species called Magnecules,that are composed of ordinary atoms and molecules under a new strong magnetic bond originating in the plane polarization of the orbits of valence electrons. The rather vast experimental verification of magnecules achieved at independent laboratories by Toups Technology Licensing is outlined, jointly with other advances in molecular structure. It is then shown that the new model of molecular structure permitted by hadronic chemistry, and the new chemical species of magnecules, do indeed permit the prediction and quantitative treatment of new clean energies and fuels of Class III. Particular emphasis is dedicated to the discovery by Santilli at Toups Technology Licensing of a ne reactor, called PlasmaArcFlow Reactor (Copyrighted, trademark, and Patents Pending) predicted by by hadronic mechanics and chemistry, that permits the production of clean combustible gases, called MagneGas (copyrighted and Patents Pending) resolving the indicated environmental problems of fossil fuels (no appreciable carcinogenic substances in the exhausts, positive oxygen balance, and carbon dioxide down to small percentages that can be controlled via chemical sponges). The new technology is quite easy in its practical realization, and essentially consists in the flow of a certain liquid within a certain electric arc. The prediction that this process is overunity for at least 1.69

is presented in Section 3.12 of Part V for independent verifications (see the outcome of its certification in the followin Section II of this web page). Part then identifies the hadronic laws, geometries and conditions for new energies of Cla III, and shows that hadronic mechanics supports in full, although under novel perspectives, most of the currently kno new energies of Class III with clear experimental backing, yet current poor efficiency, including: the electromagnetically pinched deuteron energy; the so-called cold fusion; Mills[1] Blacklight; and other new energies. It is shown that all these new energies have not achieved efficiencies of industrial relevance until now because of their lac of verification of hadronic laws of Class III. A number of Hadronic Reactors of Class III are then proposed, including various Hadronic Fusion Reactors, that are based on the most efficient possible realization of all hadronic laws, geometries, and conditions of Class III. Thanks are expressed to several individuals and corporations in three pages o acknowledgments, with particular reference to: the Department of Energy and the Hadronic Press, Inc., for funding t research over a protracted period of time; the Journal of New energy, for publishing all together the series of five articles; and Toups Technology Licensing, for permitting and supporting measurements on fundamental aspects contrary to the predictions of quantum mechanics and chemistry, which measurements have now acquired a truly basi role for new, clean energies and fuels.

3.2. HADRONIC SUPERCONDUCTIVITY

The fundamental feature that permits an ordinary electric current to become superconducting in properly selected conductors is the **bonding-correlation of identical electron pairs in singlet couplings**, generally known as Cooper pairs.

The increased conductivity can be understood by the fact that individual electrons have electric and magnetic fields, while pairs of electrons as in Figure 3.1 have a double charge $2e$, yet a virtually null magnetic field. The advantages o the propagation of the latter over the former is then evident, due to the absence of magnetic interactions for the latter and related disturbances in propagation because of interactions with atomic fields. In summary, a current of paired electrons in singlet couplings has an efficiency necessarily bigger than that of a current constituted by individual electrons.

It is well known that quantum mechanics can represent superconductivity only at the statistical level, that is, at the lev of an ensemble of large numbers of Cooper pairs, and cannot evidently represent the very foundations of superconductivity, the bonding of electrons in singlet coupling, thus mandating the construction of a covering theory for real scientific advances in the field.

A. O. E. Animalu [3] and, subsequently, Animalu and Santilli [4] have constructed **hadronic superconductivity**, tha is, the generalization of superconductivity permitted by hadronic mechanics. Its main feature is the exact-numerical representation of the bonding of electrons in the Cooper pair as in Figure 3.1, and then the lifting of the conventional theory into a form admitting of nonlinear, nonlocal, and nonhamiltonian interactions due to deep wave-overlappings.

As it is the case for all hadronic theories, hadronic superconductivity coincides with conventional superconductivity f mutual distances sufficient to render ignorable nonlinear, nonlocal, and nonhamiltonian effects (or render ignorable wave-overlappings), and introduces new nonunitary effects only at short distances. In this sense, hadronic superconductivity is indeed a real covering of quantum superconductivity. Hadronic superconductivity is also divided into **iso-, geno-, and hyper-conductivity** for the representation of closed-reversible, open-irreversible, and multi-valued irreversible events, respectively.

Besides achieving an exact-numerical representation of experimental data, the most important function of Animalu Santilli isosuperconductivity is that of identifying the necessary conditions under which the superconducting temperature can be increased. These conditions are evidently linked to technological means for the production of Cooper pairs in sufficiently high numbers to reach practically appreciable results. In turn, these means are deeply linked to molecular models, as indicated in the next section.

As indicated in Sect. 2.7, the over-unity of Santilli's PlasmaArcFlow Reactors is crucially dependent on the electric ar

within liquids to be mostly constituted by a current of electron pairs, rather than individual electrons, thus being superconducting. For details, readers are suggested to consult the original references [1,2,3,4]

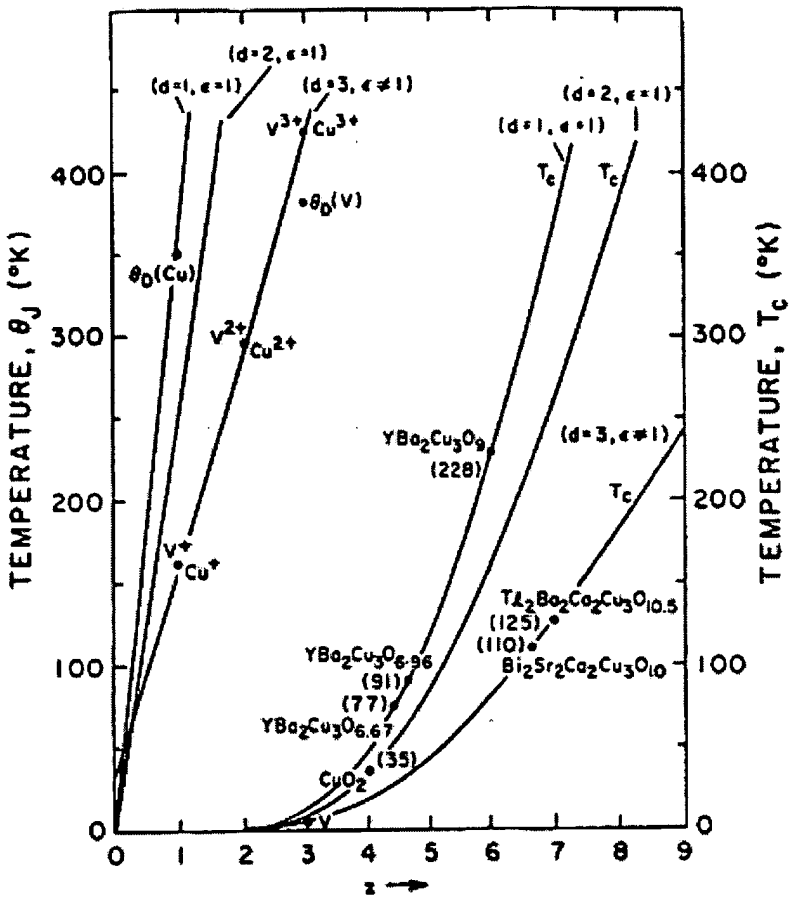


FIGURE 3.2. A plot from Refs. [3,4] illustrating the remarkable agreement of the theoretical prediction of Animal Santilli isosuperconductivity (continuous lines) with experimental evidence (dots).

3.3. HADRONIC CHEMISTRY

3.3.A. INSUFFICIENCIES OF QUANTUM CHEMISTRY

As well known to qualified chemists, despite outstanding achievements of clear historical proportions during this century, quantum chemistry is still afflicted by numerous, fundamental, unsolved problems, insufficiencies, or sheer inconsistencies, that were treated in technical detail in Refs. [1], such as:

1) Lack of a sufficiently strong molecular bonding force. The forces currently assumed in molecular bonds (the exchange, van der Waals, and other forces) were conceived for nuclear structures, in which field they are known to b weak. This is the historical reason that demanded the additional introduction in nuclear physics of strong forces. Moreover, the classical average of currently assumed, bonding forces implies an identically null force between different atoms, as anybody can verify. Thus, the current description of molecular structures according to quantum chemistry misses the equivalent of the strong force in nuclear structures.

2) Impossibility to explain why the hydrogen, water, and other molecules have only two hydrogen atoms. The currently used bonding forces of nuclear type were conceived for an arbitrary number of constituents, as an evid necessary condition to have meaning for nuclei. Any graduate student in physics or chemistry can, therefore, prove that, under the current models of molecular, the hydrogen molecule can be H_3 or H_8, or H_27, and the water

molecule can be H_3O, H_12O, H_27O, etc.

3) Lack of accurate representation of molecular binding energies and other molecular characteristics without manipulation of basic principles. As well known, a historical amount of about 2% of the experimental value of molecular binding energies is still missing in quantum chemical representations, e.g., in self-consistent treatments.

4) More accurate representations of molecular characteristics imply departures of basic quantum axioms and laws. More accurate representations of molecular binding energies have been recently achieved, but they require structural modification of the Coulomb law with Gaussian and other factors called ''screenings''. However, Gaussian screened Coulomb forces do not allow the existence of the hydrogen atom, imply necessary instabilities of all electron orbits, and prohibit the use of the very notion of ''quantum of energy'', because quanta are emitted or absorbed only between stable orbits, as well known. A similar occurrence holds for variational methods that, besides admitting an unlimited number of free parameters of completely unknown physical or chemical origin (thus being of purely mathematical character), can be proved by graduate students to violate the very conditions to preserve a ''quantum'', e.g., because variational solutions cannot be solutions of genuinely quantum Schrodinger equations (otherwise the latter would have permitted exact representations).

5) Impossibility to conduct meaningful thermochemical calculations The 2% currently missing in the binding energy is misleadingly small, because it implies an error of about 950 Kcal/mole, while an ordinary chemical reaction implies about 20 Kcal/mole. Therefore, quantum chemistry implies thermochemical calculations in which the error ca be 50 times bigger than the energy considered, thus preventing and seriously scientific thermodynamical calculations

6) Excessive times in computer calculations Computer calculations in chemistry are known to require up to months of continuous running time, despite the use of the most modern possible computers. This is a clear indication the insufficiency of the theory, rather than of the computer.

7) Major disagreement between the correlations used in current orbital theories and experimental evidence Current orbital theories use an arbitrary number of electrons in their correlations, while experimental evidence establishes that correlation only occurs for electron pairs. This evidence establishes an additional insufficiency of the theory (see [1] for technical details).

8) Lack of accurate representations of molecular electric and magnetic moments In fact, current representations are sometimes wrong even in the sign, let alone the value.

9) Prediction by quantum chemistry that all molecules are ferromagnetic (Figures 3.3), that is in evident, dramatic disagreement with experimental evidence.

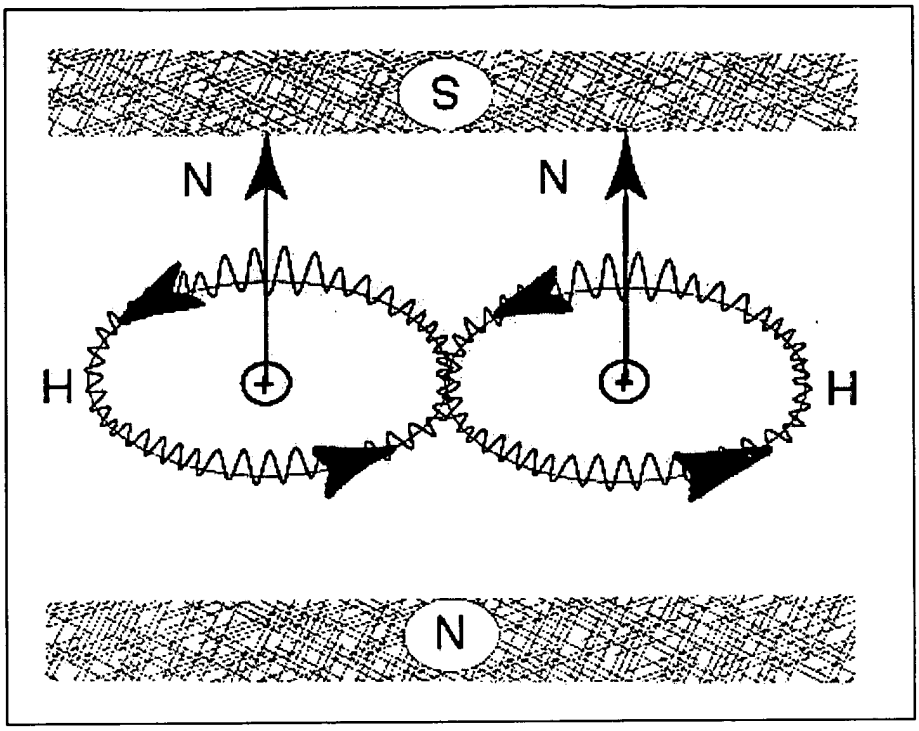


FIGURE 3.3: A schematic view of the prediction by quantum chemistry that all molecules are ferromagnetic, here expressed for the case of the hydrogen molecule H_2 = HH considered at absolute zero degree temperature and in the absence of any motion. The prediction is an unavoidable consequence of the current conception of molecular structures, in which the bond is due to exchange and other forces of nuclear type, under which each atom preserves its individuality. The most rigorous discipline of this century, quantum electrodynamics, then establishes that, under an external magnetic field South-North, the orbits of all valence electrons must acquire such a plane polarization to offer the opposite polarity North-South. This implies the production of a total net magnetic polarity in the hydrogen molecule that is in dramatic disagreement with experimental evidence. The only way known to resolve the above inconsistency is the introduction of a much stronger correlation among the two electrons, that, however, is outside quantum mechanic and chemistry, but fully permitted by their hadronic covering [1].

Under so many fundamental insufficiencies and sheer inconsistencies, real scientific studies of ''new'' fuels and energ based on quantum chemistry are unwarranted, thus justifying the use of covering theories.

3.3.B. HADRONIC CHEMISTRY

It is evident that the origin of the insufficiencies and inconsistencies of quantum chemistry outlined above are not due to quantum chemistry itself, but rather to the underlying theory, quantum mechanics. It is today known that the indicated problems are due to the absence of a meaningful representation by quantum mechanics of the conditions of deep overlappings of the extended wavepackets of electrons, precisely as occurring in valence electron bonds (Figure 3.1).

The insufficiencies and inconsistencies of quantum chemistry in molecular structures establish that the discipline that exactly valid for the structure of the individual hydrogen atom (quantum mechanics), cannot possibly be exact for the bonding of two hydrogen atoms into the hydrogen molecule. This is due to the appearance in the H-structure of short-range, nonlinear, nonlocal, and non-Hamiltonian effects as depicted in Figure 3.1, that are completely absent in the individual H structure, thus confirming the need in chemistry for a more adequate theory.

Thanks to the preceding achievement of mathematical, theoretical, and experimental maturity by hadronic mechanics and superconductivity, R. M. Santilli and D. D. Shillady [5,6,7] have constructed a generalization covering of quantum chemistry under the name of **hadronic chemistry,** that is also based on the novel iso-, geno-, and hyper-mathematics (page 18). Therefore, hadronic chemistry contains three corresponding branches also called **iso-, geno-, and hyper-chemistry,** that are used for a more accurate representation of conservative reversible molecular structures, irreversible chemical reactions, and multi-valued biological systems, respectively.

Since this page is devoted to molecular structures, that are notorious conservative and invariant under time reversal, w

shall solely use isochemistry. Unless otherwise specified, the terms "hadronic chemistry" are referred in this page to isotopic branch.

In essence, isochemistry has permitted the construction of a new model of molecular structure, known under the nam of **Santilli-Shillady isochemical model of molecular bonds.** Its main feature is the assumption that **pairs of valence electrons from two different atoms couple themselves in a singlet quasiparticle state at short distances, called isoelectronium, with main characteristics**

Charge: 0; spin 0; magnetic moment 0; rest energy 1.0 MeV (max); Radius 6.8432329 x 10-11 cm = 0.015424288 bohrs

that orbits around both nuclei in an oo-shaped orbit around the respective nuclei. Such a molecular model is similar to that of planets in certain binary stars.

It should be indicated that, as it is the case for the electric pairs of the helium, and the Cooper pair in superconductiv the Santilli-Shillady isoelectronium is not a permanently stable particle, due to exchange and other effects.

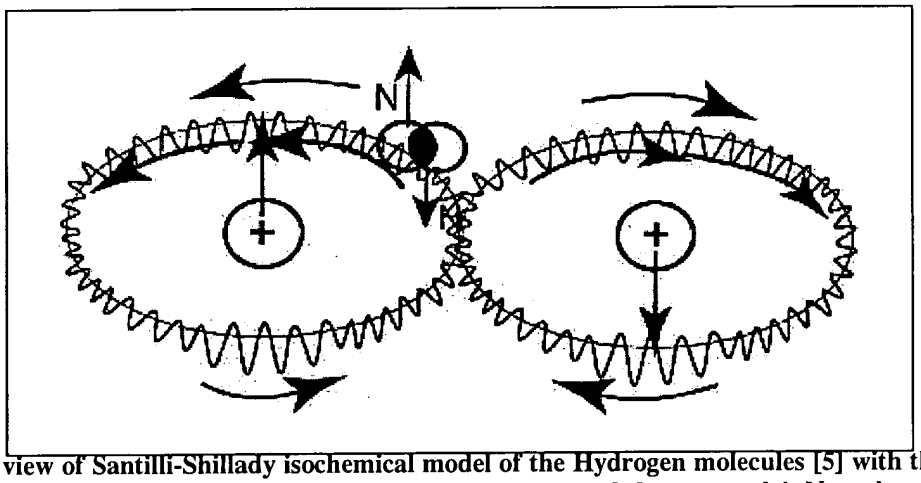


FIGURE 3.4: A schematic view of Santilli-Shillady isochemical model of the Hydrogen molecules [5] with the two electrons bonded in singlet coupling into the isoelectronium, that describes an oo-shaped orbit around the two nuclei. Note the opposite direction of rotation of the isoelectronium in the two o-branches, with consequential opposite magnetic moments. This configuration prevents the acquisition by the hydrogen molecule of a net magnetic polarity, thus avoiding the inconsistency of quantum chemistry of Fig. 3.3. Th model is evidently considered at absolute zero degrees K and in the absence of all rotational, vibrational and other motions. Note also that isoelectronium cannot be permanently stable [5,6,7].

A feature of the isoelectronium of particular significance for new energies is that of having an essentially null intrinsi magnetic moment (in first nonrelativistic approximation, with non-null quadruple and higher moments). The above ne conception of molecular structure has permitted the resolution in Refs. [5,6,7] of all insufficiencies and inconsistencie of quantum chemistry outlined above. In fact:

1) Isochemistry introduces for the first time a new strong, attractive force between two valence electrons suitabl represent the strength of molecular bonds, In different terms, the new hadronic force between valence electrons is the equivalent, missing in quantum chemistry, of the strong force in nuclear structures.

2) Isochemistry explains for the first time why the hydrogen, water and other molecules have only two hydrogen atoms. Once two valence electrons are bonded into the singlet isoelectronium, they become a Boson and, as such, rej the bonding of any additional electron (that is a Fermion).

3) Isochemistry has permitted the first representation of molecular binding energies that is accurate to the sevent

digit.

4) The above accurate representations occur under the exact validity of the basic axioms of isochemistry without ad h adulterations.

5) Since the representation of binding energies is accurate to the seventh digit, isochemistry permits, for the firs time, accurate thermochemical calculations.

6) Isochemistry reduces computer usage at least 1,000 times. This is achieves via power series that converge mu faster than those of quantum chemistry.

7) Isochemistry allows correlations solely among pairs of electrons at all levels of study.

8) Isochemistry has provided representations of electric and magnetic moments also accurate to several digits [an having the correct sign].

9) Isochemistry has resolved the inconsistent prediction by quantum chemistry that all molecules are ferromagne [Figures 1.8 and 1.9].

3.3.C. SANTILLI'S NEW CHEMICAL SPECIES OF MAGNECULES

In this section we shall outline Santilli's discovery of Magnecules^TM made in 1998, by following mostly ad litteram the presentation of their original publication, Ref. [8].

The way according to which atoms can combine to form the various substances of our sensory perception, was scientifically established in the last century, thanks to the work by Avogadro (1811), Canizzaro (1858), and several others, following the achievement of scientific measurements of atomic and molecular weights. These studies produce the contemporary notion of molecules and of its underlying valence.

Until 1997, molecules remained the sole known way according to which atoms can combine to form ordinary substances. The notion of valence has also remained the dominant mechanism for the bonding of atoms, although, wih the passing of the decades, it was specialized into covalence, ionic valence, metallic valence, and others (see any quantum chemistry book).

In 1998 R. M. Santilli [8] discovered basically new means for atoms and molecules to bond themselves into clusters that are stable at ordinary conditions. Santilli called the new species **magnecules** to denote the magnetic nature of their origination and bond, and to distinguish them from molecules holding for conventional valance bonds.

Thanks to an invaluable backing by Toups Technology Licensing, the notion of magnecules received, also in 1998, numerous experimental verifications at independent analytic laboratories, that are outlined in Sections 4 and 5. In this process, a new technology was established for the creation of magnecules that is today known as the **ETL technology of magnetically polarized gases**.

The sole force fields in the atomic structure studied by chemists prior to Refs. [8,9] have been the electric field of the individual peripheral electrons, and the intrinsic magnetic field of nuclei and electrons. It was proved a century ago th these fields can only produce valence bonds, thus explaining the reason why the notion of molecules was the only one admitted for about two centuries.

Santilli's [loc. cit.] main discovery has been the identification of a a new force field in the atomic and molecular structures, thus permitting a new chemical species.

Since the inception of atomic physics, peripheral electrons have been assumed to have a spherical distribution around nuclei, that is indeed the case under ordinary conditions, as experimentally established. However, electrons are charg particles, and all charges rotating in a plane orbit create a magnetic field in the direction perpendicular to the orbital

plane, generally assumed with the North polarity in the semispace seeing a counter-clockwise rotation. Moreover, it is known that the distribution in space of electron orbits can be controlled via the use of external magnetic fields.

Santilli's [loc. cit.] main hypothesis is that the spherical distribution at least of the valence electrons in the natural sta of atoms can be controlled via suitable external magnetic fields, and, in first approximation at absolute zero degree, c be polarized a plane (the actual distribution being toroidal). In turn, the transition of the electrons orbits from a spherical; distribution to a plane polarization creates a basically novel magnetic field that does not exist in the natural state of the atoms.

Moreover, Santilli [loc. cit.] computed the magnetic field created by the polarized orbiting electron of the hydrogen atom, and showed that its numerical value is 658.50 times bigger than that of the nucleus (the proton), while the magnetic moment of the polarized isoelectronium orbit in the hydrogen molecule is 1,316.33 times bigger than the intrinsic magnetic moment of the nucleus. Such a high value of the field was expected from the fact that the orbital speed of electrons approaches the speed of light, thus resulting in very strong magnetic fields associated with plane orbits. These numerical values have been independently verified by Aringazin and Kucherenko [10] and others.

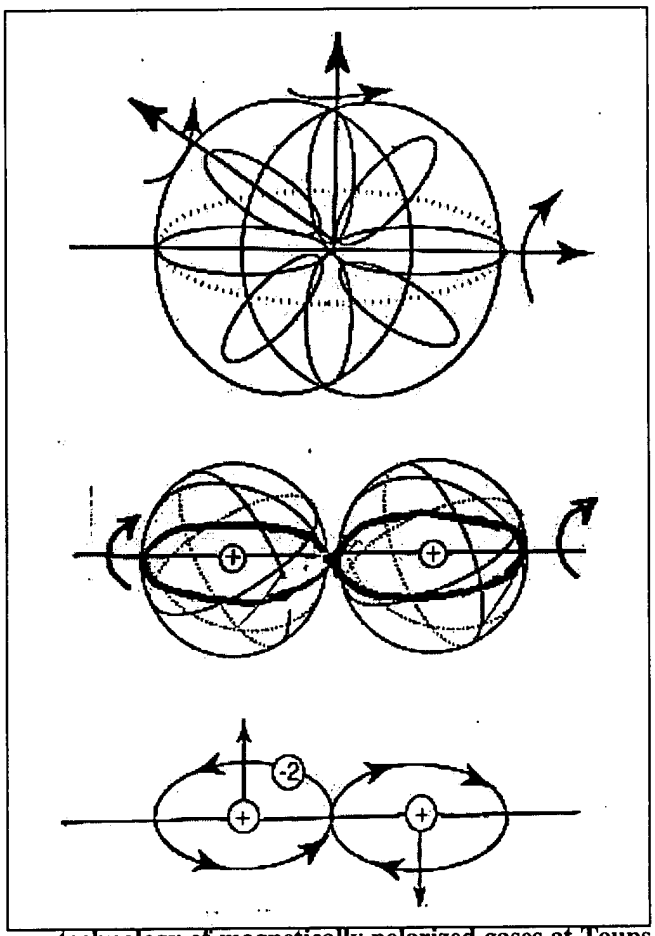


FIGURE 3.5: A schematic view of the new technology of magnetically polarized gases at Toups Technology Corporation, here presented for the simplest possible case of the hydrogen molecule. The technology essentially consists of electric and/or magnetic and/or electromagnetic means to eliminate the rotational motion of the orbits of the valence electron pairs. The upper view shows an H-molecule in its conventional spherical state. The middle view shows the same molecule in which the rotation of the two H-atoms has been eliminated via external magnetic and/or other fields, although each Hatom preserves its spherical distribution. The lower view shows the polarization of the orbit of the valence electrons in a plane (actually within a toroid). In the last case, we have the emergenc of the magnetic moment due to the rotation of the electrons in plane orbits , that is simply absent in conventional conditions of the molecule.

Other possible origin for the bond of the new chemical species must be eliminated due to known insufficiencies. For instance, the intrinsic magnetic moments of nuclei cannot possibly produce a molecular bond, first, because these fiel

are too weak, and, second, because they are too far from each other on atomic scale. Similarly, the electric polarizati of atoms (i.e., their deformation in such a way to offer the dominance of one charge in one side, and the other charge the opposite side) cannot form a stable molecular bond, because of the known instability of the electric polarization itself.

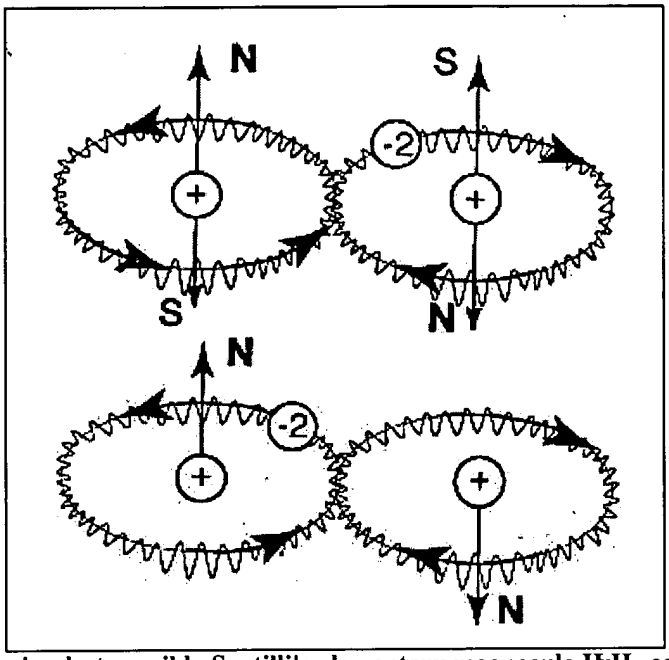


FIGURE 3.6: A schematic view of the simplest possible Santilli's elementary magnecule $H_2 x H_2$ composed of two plane polarized hydrogen molecules in mutual magnetic bond. Note that, once the magnecule has been formed, it is stable (at ordinary conditions) because of the high value of the magnetic forces at the small interatomic distances of the bond. Note also that the elementary magnecule is considered here at absolute zero degree Kelvin and in the absence of any motion. At ordinary temperature, the magnecule is predicted to appear as a sphere of the same size as that of one conventional hydrogen molecule, yet possessing a molecular weight very close to that of the helium. Similar elementary magnecules are predicted for $H_2 x O_2$, $O_2 x O_2$, COxCO, $COxCO_2$ etc.

The above model of magnecules can be represented as follows. Denote the valence bond according to isochemistry with the symbol " - " and represent the new magnetic bond with the symbol " x ". A conventional, unpolarized hydrogen molecule is then written as H-H. When polarized, the same molecule acquires the structure $H_{\{up\}}$-$H_{\{down\}}$. By comparison, the same molecule according to quantum chemistry would have the structure $H_{\{up\}}$-$H_{\{down\}\{up\}}$ that is in disagreement with experimental evidence.

The "elementary magnecule" of the Hydrogen (Fig. 3.6) can then be written

$$(H_{\{up\}} - H_{\{down\}}) \times (H_{\{up\}} - H_{\{down\}}) ,$$

where the pairing $H_{\{up\}} \times H_{\{up\}}$ is the most elementary possible one, that of two hydrogen atoms one against the other i which the South polarity of one atom is bonded to the North polarity of the other atom.

Needless to say, isochemistry predicts the possibility that additional hydrogen molecules or individual H atoms can bond themselves to the above elementary magnecule, resulting in magnecules of the type

$$(H_{\{up\}} - H_{\{down\}}) \times (H_{\{up\}} - H_{\{down\}}) \times (H_{\{up\}} - H_{\{down\}}) \times H_{\{up\}} ,$$

The above model permits a quantitative understanding of the experimental results presented in Sections 4 and 5. First the model permits the identification of the magnecules of Fig. 1 (such as peaks with amu 124, 228, 254, 355, 479, et that cannot exist for quantum chemistry) as clusters of polarized atoms $H_{\{up\}}O_{\{up\}\{down\}}$, $C_{\{up\}\{down\}}$ and all their possible molecules also in polarized form, resulting in the generic structure

$$(H_{\{up\}} - H_{\{down\}}) \times (O_{\{up\}} - O_{\{down\}}) \times [C_{\{up\}} - O_{\{down\}}) \times$$
$$(H_{\{up\}} - O_{\{down\}\{up\}} - H_{\{down\}}) \times (O_{\{up\}} - C_{\{down\}\{up\}} - O_{\{down\}}) \times H_{\{up\}} \ldots ,$$

Quantitative interpretation of Anomalies 1) to 5) then follows and will be studied in detail in a technical paper. Note h crucial role of hadronic mechanics [5] in these results.

A word of caution should be voiced here to point out the complexity of the magnetic moments of the isoelectronium orbits for all structures more complex than the hydrogen. As an example, the water molecule has two isoelectronia, o per each H-O dimer, with symmetry axes intersecting at the known 105 angle, plus the additional six electrons of the oxygen, resulting in a rather complex magnetic structure whose systematic study is under way [8].

In summary, we can introduced via the following:

DEFINITION [8,9]: Santilli's electromagnecules, or more simply magnecules, constitute a new chemical species in gases, liquids or solids that is composed of isolated atoms H, C, H, etc., dimers OH, CH, etc. and molecules H_2. CO, etc., under a new magnetic bond due to the toroidal polarization of the orbits of [at least] the valence electrons under strong electric and magnetic fields, which species is stable at ordinary conditions of temperatur and pressure, and is characterized by the following properties:

I) The new species has variable molecular weight, depending on the number of atoms and molecules possessing the needed magnetic polarization, which molecular weight can be a multiple of the conventional molecular weight for the same atomic constituents;

II) The new species is identified in mass spectrometry by new peaks that result to be "unknown" in the computer search among all known conventional molecular structures;

III) The new peaks identified in the mass spectrometry have no infrared [for gases] or ultraviolet [for liquids] signature at all, as a necessary condition not to have a valence bond, the sole infrared or ultraviolet signatures being those of the conventional atoms or molecules constituting the new species;

IV) The new species has anomalous physical and chemical characteristics, including anomalous infrared or ultraviolet signatures, anomalous penetrations throught other substances, anomalous adhesion to other substances, anomalous viscosity, etc.;

V) The new chemical species, its peaks, and all its anomalous features disappear at a sufficiently high temperature [the Curie point of the new species] evidently varying from substance to substance.

Magnecules are called: elementary when composed of only two molecules; magneplexes when entirely composed by several identical molecules; and magneclusters when composed by molecules of different type.

3.3.D. CREATION OF MAGNECULES IN GASES, LIQUIDS, AND SOLIDS.

It was easy to see that one of the strongest, readily available sources of magnetic fields in gases is an electric arc. Therefore, Santilli predicted that magnecules exist in gases and liquids exposed to an electric arc. In this section we outline separately the experimental evidence for magnecules in gases, liquids, and solids.

All gases produced via a subnmerged electric arc possess a magnecular structure that is enhanced by the PlasmaArcFlow^TM process. The outline of magnecules of this web page will be referred hereon to Magnegases^TM with the understanding that all gases of Refs. [11] have Santilli's magnecular structure.

An electric arc in a waterbase liquid decomposes the various compounds by forming a plasma at about 5,000 C of mostly ionized atoms of hydrogen, oxygen, carbon and other elements, that combine in a variety of ways, forming nonexplosive combustible gases with clean emission exhausts. The new gases cool down in the surrounding liquid, an bubble to the surface where they are collected with various means.

Santilli's main hypothesis [8] is that, at the time of their formation under an electric arc, gases H_2, HCO, CO_2, O_2, etc. do not have a conventional structure because the orbits of [at least] their valence electrons are mostly polarized in a plan due to the very intense magnetic field surrounding the electric arc (of the order of 10 Tesla or more). In turn, such a polarization implies the creation of strong magnetic moments, resulting in new magnetic bonds constituting the magnecules.

Conventional mass spectrometric analyses, after adjustments due to possible air contamination (indicated by nitrogen content) and averaging over various methods of production, suggested the following:

Conventional chemical composition of Magnegases:

H_2: 48 %
CO: 44 %
O_2: 5 % CO_2 2 %
Misc. struct. in ppm: 1 %.

However, the above chemical analysis is in dramatic disagreement with a variety of experimental evidence. For instance, the heaviest molecule present in Magnegases^TM in macroscopic percentage is CO_2 with a molecular weigh of 44 amu. However, ,GC-MS measurements have shown the presence of macroscopic peaks all the way to 1,000 am that evidently have no conventional explanation via quantum chemistry.

Numerous other discrepancies existed between the predictions of quantum chemistry and the experimental evidence o Magnegases, such as anomalous passage of hydrogen through surfaces, anomalous deflation of balloons, anomalous attraction of floating balloons by metal beams, and other behavior dramatically beyond the prediction of quantum chemistry.

Therefore, Santilli conjectured that all gases produced via an electric discharge are indeed composed by conventional molecules under a special magnetic bond, thus resulting in a new chemical species.The conjecture was confirmed by variety of GC-MC/IRD measurements reviewed below.

Santilli [8] additionally constructed Magnecules in liquids via methods essentially similar to those for gases. In fact, liquid magnecules were first constructed via the exposure of aromatic oils to strong magnetic fields, and subsequently detected via LC-MSD/UVD. Additional, much more evident liquid magnecules were constructed by passing the liquid through electric arcs, according to the PlasmaArcFlow^TM technology.

Finally, Santilli [loc. cit.] constructed magnecules in solids via the mere freezing of liquids with a magnecular structu

3.3.E. ANOMALIES OF MAGNECULES

The experimental verification of gas magnecules requires the detection of a number of anomalies that can be summarized as follows:

Anomaly 1: Appearance of unexpected heavy MS peaks.
Gas magnecules are generally heavier than the heaviest molecule in a given gas. Peaks in the GC-MS are therefore expected in macroscopic percentages with molecular weights bigger than the heaviest molecule. These heavy composites should not provide MS peaks according to quantum chemistry, thus constituting an anomaly. As an example, by ignoring heavy compounds in parts per million [ppm], Magnegases^TM should have no large peak in the GC-MS with more than the CO_2 molecular weight of 44 a.m.u. The existence of heavier large peaks would establish this first anomaly.

Anomaly 2: "Unknown" character of the unexpected heavy peaks.
To provide the initial premises for magnecules, the peaks of Anomaly 1 should result in "unknown" in the search by GC-MS computer in its memory banks of conventional molecules, usually including about 150,000 molecules.

Anomaly 3: Lack of IR signature of the "unknown" peaks.

Another necessary condition to have magnecules is that the "unknown" peaks of Anomaly 1 should have no infrared signature at all. According to established evidence, all gases with a valence bond must have a well defined infrared signature [with a few exceptions of spherically symmetric molecules, such as hydrogen]. In the event the peaks of Anomaly 1 do have an infrared signature, they can be constituted by new yet conventional molecules not identified before. The only infrared signatures of any given gas magnecule should be those of the conventional molecules and atoms constituting the cluster itself. As an illustration, the only admissible infrared signatures of magnecule {O x {O_2} are those of the conventional molecules O-O and CO.

Anomaly 4: Mutation of conventional IR signatures.
The infrared signatures of the molecules constituting a magnecules are expected to be mutated, in the sense that the shape of their peaks is not the established one. This is another anomaly of magnecules expected from the polarization of the orbits of the valence and other electrons. In fact, this polarization implies space distributions of the orbitals different than the conventional ones, thus resulting in a deformation of the shape of the IR peaks. Moreover, the same polarizations are expected to create additional strong bonds within a conventional molecule, that are expected to appe as new IR peaks. Still in turn, such an internal mutations of conventional molecules have far reaching scientific and technological implications, as will be shown.

Anomaly 5: Mutation of magnecules.
While molecules preserve their structure at conventional temperatures and pressures, this is not the case for magnecules, that are expected to mutate in time, that is, to change the shape of the MS peaks due to change in their constituents. Since we are referring to gases whose constituents notoriously collide, magnecules can breakdown into parts during collisions, which parts can then recombine with other magnecules to form new clusters. Alternatively, magnecules are expected to experience accretion [or emission] of polarized conventional atoms or molecules without necessarily breaking down into parts. It follows that the peaks of Anomaly 1 are not expected to remain the same ove sufficient period of time for the same gas under the same conditions.

Anomaly 6: Mutated physical characteristics.
Magnetically polarized gases are expected to have mutated physical characteristics because the very notion of polarization of the orbits implies a smaller average molecular volume. Mutations of other physical characteristics are then consequential.

Anomaly 7: Anomalous adhesion.
Magnetically polarized gases are expected to have anomalous adhesion to walls of disparate nature as compared to the same unpolarized gas. This is due to the well known property that magnetism can be propagated by induction, according to which a magnetically polarized molecule with a sufficiently intense magnetic moment can induce a corresponding polarization of valence [and_or other] electrons in the atoms or molecules constituting the walls surfac Once such a polarization is created by induction, magnecules can have rather strong magnetic bonds to said walls.

Anomaly 8: Increased penetration through substances.
Magnetically polarized gases are expected to have anomalous absorption or penetration through other substances. Thi is first due to the reduction of the average molecular volume with inherent increase of permeability, as compared to t same unpolarized gas. The second reason is the magnetic induction of the preceding anomaly.

Anomaly 9: Increased energy release.
Magnetically polarized gases are expected to have thermochemical reactions with macroscopic increases of energy releases, as compared to the same reactions among unpolarized gases, an expected anomaly that, alone, has large scientific and industrial significance.

All the above anomalies are expected to disappear at a sufficient high temperature, evidently varying from gas to gas (Curie point), while the anomalies are expected to be enhanced at lower temperature and survive liquefaction.

Liquid magnecules have essentially the same anomalies, while those of solid magnecules are evidently different due to lack of fluidity, thus requiring a special study.

3.4. EXPERIMENTAL EVIDENCE OF MAGNECULES IN GASES

3.4.A. NECESSARY CONDITIONS FOR THE DETECTION OF GAS MAGNECULES

The experimental detection of Santilli's magnecules^TM is difficult due to the fact that conventional analytic equipment and methods have been developed for conventional properties. As such, these instruments are generally ineffective for the measurement of the anomalous properties of magnecules.

For instance, Anomalies 1 through 6 should be established by GC-MS. However, most GCMS machines are not suitable to detect magnecules because they usually operate at temperatures generally higher than the Curie point of th magnecule to be detected. In this case, the measuring equipment itself destroys the very features to be measured. The few GC-MS that are suitable for the tests should be operated in a way significantly different than the conventional on again, to prevent destroying the very features to be measured.

Additional difficulties are created by the rather universal tendency in analytic laboratories to throw a conventional interpretation at any peak in the GCMS, without considering any IR verification at all. When dealing with magnecule such conventional "explanations" are vacuous and of generally of nonscientific nature, because the conventional molecular interpretation of peaks in the GC-MS are completely disproved by the lack of IR signatures [as recalled earlier, with very few exceptions for low a.m.u. that do not apply to large magnecules in the 500 a.m.u range, clear signatures are a necessary condition to have a conventional valence bond].

The above tendency of throwing conventional molecular interpretations of any GC-MS peak is so widespread, that GC MS equipment are not generally equipped with an IRD, as it is usual in academic analytic laboratories. In view of the above occurrences, to prevent a waste of time without real science, researchers are strongly recommended to prevent prohibit, or otherwise avoid any measurement of magnecules with GC-MS equipment without IRD.

Additional difficulties are of human nature, and due to the fact that analysts with long and outstanding experience in conventional analytic procedures, are generally reluctant to change their methods, thus preventing the measurement o new characteristics.

The necessary conditions for scientific measurements of gas magnecules with gas chromatographic, mass spectroscop equipment are the following:

Condition 1: GC-MS should permit measurements of peaks at ordinary temperature (say, 10 C 30 C), and the feeding lines should be cryogenically cooled.
GC-MS are routinely operated at temperatures of the order of 150 C to 250 C, for which no magnecule is expected to exist. To put it explicitly, the conventional operation of GCMS destroys the very clusters to be detected, and this identifies a first reason for the lack of detection of magnecules until now.

Condition 2: GC-MS must be equipped with IRD.
In the absence of IRD, no measurement should be considered to be scientific or final [because of the lack of 50% of t necessary information for a serious conclusion]. Since the great majority of GCMS are not equipped with IRD, this provides an additional reason why the magnecules have not been detected in until now. In reality, numerous magnecules have been indeed detected in academic laboratories, but were misinterpreted as esoteric molecules precisely because of the lack of IRD.

Condition 3: GC-MS/IRD should be equipped with feeding lines of at least 0.5 mm ID.
GC-MS are usually operated with feeding lines with the smallest possible ID, at times of the order of 0.1 mm. This additional unusual requirement is due to Anomaly 7, i.e., the enhanced adhesion of magnecules to the metallic walls o the feeding line, that become cloggedup to the point of preventing the passage of the most interesting magnecules, the big magneclusters with molecular weight in the 1,000's a.m.u. This is another condition analysts with extended practi

on conventional gases can only accept after being exposed to the evidence.

Condition 4: GC-MS should be set to detect peaks at molecular weights where the analyst usually expects none. This condition identifies another reason why magnecules have simply not been looked for until now. As an illustratio the most interesting molecular weights for Magnegases^TM are those bigger than their heaviest conventional molecule i.e., bigger than 44 a.m.u. It goes without saying that smaller molecular weights are also important once the analyst seeks an anomaly, rather than a conventional result.

Condition 5: The ramp time should be the longest admitted by the GCMS/IRD and of at least 25 minutes. In general, for the evident reason to reduce costs, the ramp time is set at the smallest possible operational value, that perfectly acceptable for conventional gases, but substantially inappropriate for the anomalies we have to detect. As w be shown, for the case of magnetically polarized gases a small ramp time implies the clustering of all magnecules into one single peak. The analyst then looks at each individual constituent of such a unique large peak, evidently finds full conventional molecules, thus reaching the "experimental belief" that the peak represents conventional molecules. For sufficiently large ramp time, the magnecules are instead represented by well separated, large individual peaks. In this case the analyst is forced to identify these peaks individually. Then, and only then, the computer [rather than the analyst] will establish that the MS peaks are "unknown", and confirm the "unknown" character in the absence of IR signature. The latter then establishes the magnecule because it establishes the lack of valence bond for the peak considered.

Numerous other conditions exist for GCMS_IRD to be effective in the detection and identification of magnecules. They are of more technical nature and will be indicated whenever needed.

Besides the problems in identifying an appropriate GCMS_IRD, additional difficulties exist in the identification of other instruments capable of providing effective measurements of the other Anomalies 9, again, because the available instruments have been designed for the measurement of conventional rather than anomalous features.

As an illustration, by far the most difficult measurement of Magnegases^TM has been the achievement of credible scientific values of energy content in British Thermal Units [BTU] per cubic foot [cf]. By comparison, the measurement of the BTU/cf of gases with a conventional chemical structure is so elementary nowadays to be computerized following GC-MS data.

Significantly, all methods currently available to measure the BTU/cf failed to provide results of any credibility for gases with magnecules. This is the case of computerized computation of BTU/cf from GCMS results] and some conventional calorimeters did not even allow Magnegases^TM to burn, let alone to make a measurement. This is the case of the computerized calorimeters for methane whose air intake is too big for the combustion of all Magnegases^TM and its required adjustment is outside the range of the computer program.

Similar difficulties were encountered via the use of EPA analytic techniques, evidently because they are not designed detect anomalies.

The conditions for scientific measurements of magnecules in liquid are the same as those for gas magnecules, except for the use of Liquid Chromatography Mass Spectrometers [LCMS] equipped with UltraViolet Detector [UVD].

3.4.B. EXPERIMENTAL EVIDENCE OF SANTILLI'S MAGNECULES IN GASES

The first clear experimental evidence of gas magnecules was established by Santilli [8] on June 19, 1998, at the analytic laboratory of NATIONAL TECHNICAL SYSTEMS [NTS] located at McClellan Air Force Base, Sacrament California. The measurements on were conducted by analysts Louis A. Dee, Branch Manager, and Norman Wade wh operated an HP GC model 5890, an HP MS model 5972, and an HP IRD model 5965. Upon inspection on arrival, th the instrument met all conditions 1 to 5, Santilli then, and only then, authorized the measurements.

Thanks to a professional cooperation by the NTS analysts, the equipment was set at all the unusual conditions indicat earlier. In particular, the equipment was set for the analytic method VOC IRMS.M utilizing an HP Ultra 2 column 25

long with a 0.32 mm ID and a film thickness of 0.52μm. I also requested to conduct the analysis from 40 a.m.u. to the instrument limit of 500 a.m.u. This condition was necessary to avoid the CO peak of magnegas at 28 a.m.u. that is so large to dwarf all other peaks.

Moreover, NTS analysts were fully cooperative in implementing unconventional settings of the instrument. In fact, th GC-MS_IRD was set at the lowest possible temperature of 10 C; the biggest possible feeding line with an ID of .5 mn was installed; the feeding line itself was cryogenically cooled; the equipment was set at the longest possible ramp tim of 26 minutes; and a linear flow velocity of 50 cm_sec was selected. A number of other technical requirements are available in the complete documentation of the measurements reproduced in App. A of monograph {7b}.

The analysts first secured a documentation of the background of the instrument prior to any injection of the magnetically polarized gas in view of Anomaly 7, that is evidently expected to alter the background due to anomalous residues in the instrument after the completion of the tests.

Following a final control that all requested conditions were in place, NTS analysts Louis A. Dee and Norman Wade injected the polarized gas into the HP GC-MS/IRD and initiated the tests. The results constitute the first direct experimental evidence on the existence of magnecules in gases.

After waiting for the 26 minutes of the ramp time, sixteen heavy anomalous peaks appeared in the MS screen, thus providing direct experimental verification of Anomaly 1 [Figure 3.7].

The polarized gas contains about 5% of CO_2 as per various chemical analyses conducted at high temperature, after adjustment due to air contamination. The spectrum of Figure 3.7 is from 40 a.m.u. to 500 a.m.u. Comparative inspection of the various peaks and their size establishes that they represent macroscopic percentages of compounds that, according to quantum chemistry, should not exist in the gas considered, thus providing experimental evidence fo Anomaly 1 beyond scientific doubt.

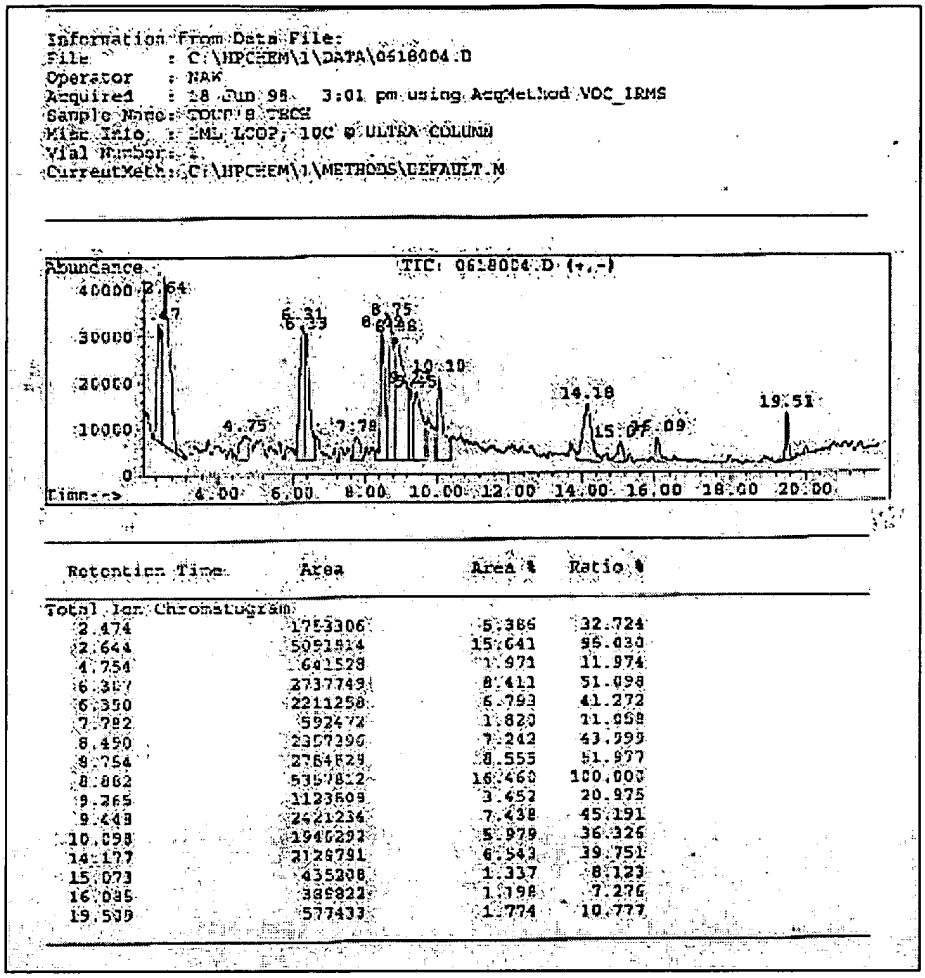
I should report that, at the appearance of the peaks of Figure 3.7, analyst Norman Wade stated "I have not seen something like these peaks in twenty five years of analyses".

The analysts then passed to the identification of the individual peaks of Figure 3.7. As illustrated in Figure 3.8 [see th complete documentation of Ref. [9] for more data], all sixteen MS peaks of Figure 3.7 resulted to be "unknown", following the computer search in the memory banks of the McClellan Air Force Base comprising about 140,000 molecules, thus providing direct experimental verification of Anomaly 2.2.

Note that there is no identifiable CO_2 peak in the MS spectrum of Figure 3.7. This absence is, per se, highly anomalous, because the CO_2 peak is well identifiable in conventional GC-MS measurements of the same gas at high temperature. In fact, the absence of the CO_2 peak in the MS range 40 amu to 500 amu is evidence that it is bonded in the remaining peaks of the spectrum.

After completing and documenting the MS data, the analysts passed to measurements at the IRD. To their surprise, none of the sixteen peaks of Figure 3.7 had any infrared signature at all, thus providing direct experimental verificati of Anomaly 3 [Figure 3.9]. The IR scan for the MS peaks of Figure 3.7 only shows a peak belonging to CO, namely, to one of the components of the peaks of Figure 3.7. The IR signature of the other components do not appear in Figu 3.9 because they are behind the left margin of the scan.

The analysts then established [Figure 3.10] that the IR peak of CO is itself anomalous (mutated), thus providing experimental evidence for Anomaly 4.



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File       : C:\HPCHEM\1\DATA\0618004.D
Operator   : NAK
Acquired   : 18 Jun 98   3:01 pm using AcqMethod VOC_IRMS
Sample Name: COLD/8 CECS
Misc Info  : 2ML LCO2, 10C @ ULTRA COLUMN
Vial Number: 4
CurrentMeth: C:\HPCHEM\1\METHODS\DEFAULT.M
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Retention Time	Area	Area %	Ratio %
Total Ion Chromatogram			
2.474	1753306	5.386	32.724
2.644	5091814	15.641	95.030
4.754	641528	1.971	11.974
6.307	2737749	8.411	51.098
6.350	2211258	6.793	41.272
7.782	592472	1.820	11.058
8.490	2357290	7.242	43.999
8.754	2764829	8.555	51.977
8.862	5357812	16.460	100.000
9.265	1123609	3.452	20.975
9.449	2421234	7.438	45.191
10.098	1940292	5.979	36.326
14.177	2126791	6.543	39.751
15.073	435208	1.337	8.123
16.085	388822	1.198	7.276
19.509	577433	1.774	10.777

FIGURE 3.7: The anomalous peaks in the MS scan of the magnetically polarized gas tested first detected at NTS on June 19, 1998. from 40 to 500 amu under conditions 1) to 9) of the text.

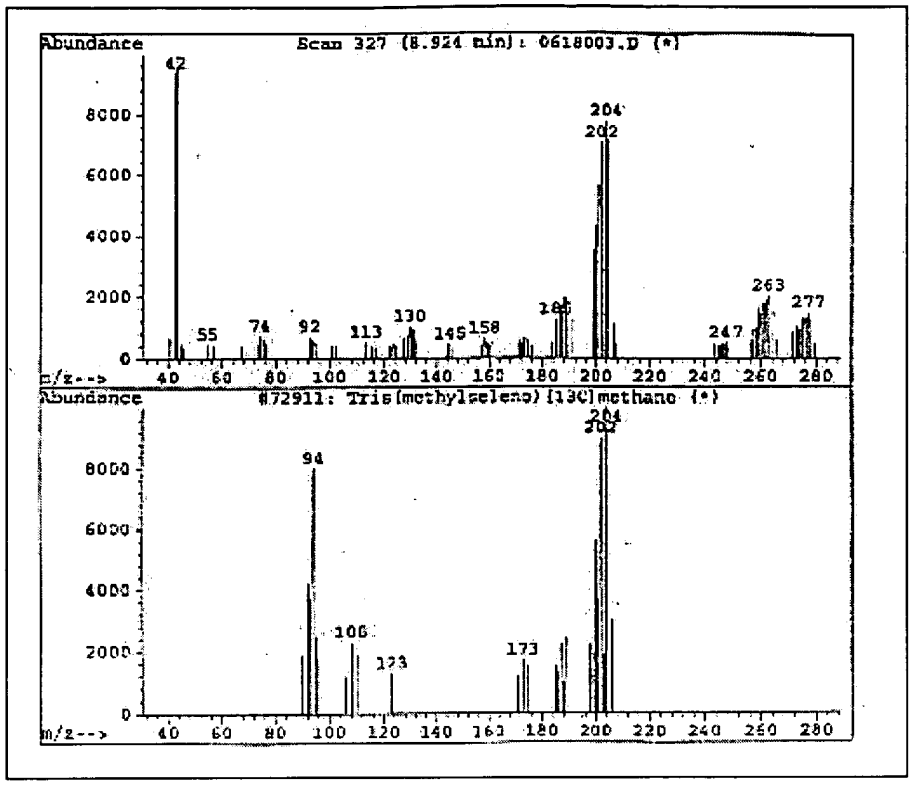

FiGURE 3.8. One of the peaks of the new species, the peak at 8.924 min (top figure), and the lack of its identification by the computer search (bottom figure).

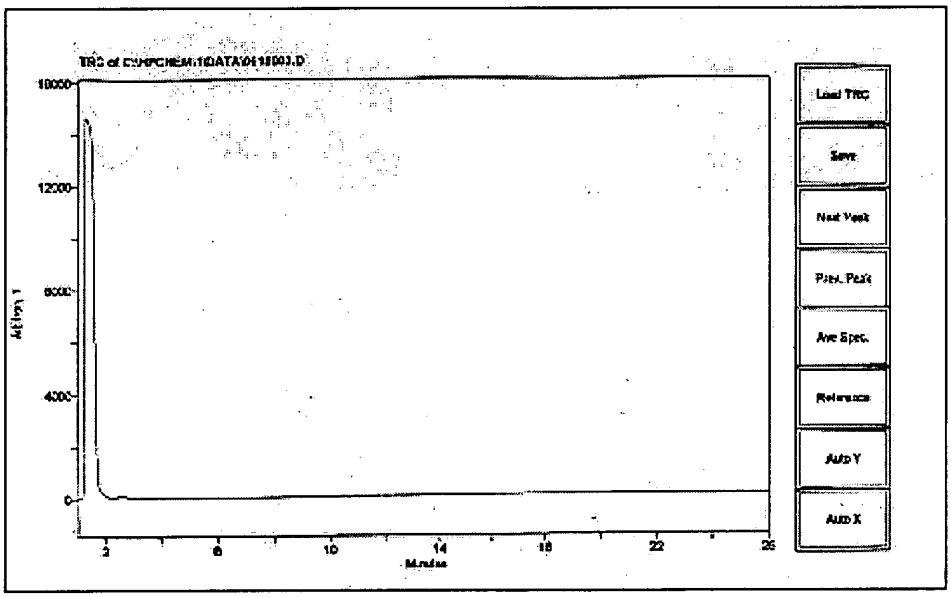

FIGURE 3.9. The anomalous IR scan establishing that all MS peaks of Fig.3.7 do not have an IR signature, the detected IR peak bein that of CO_2.

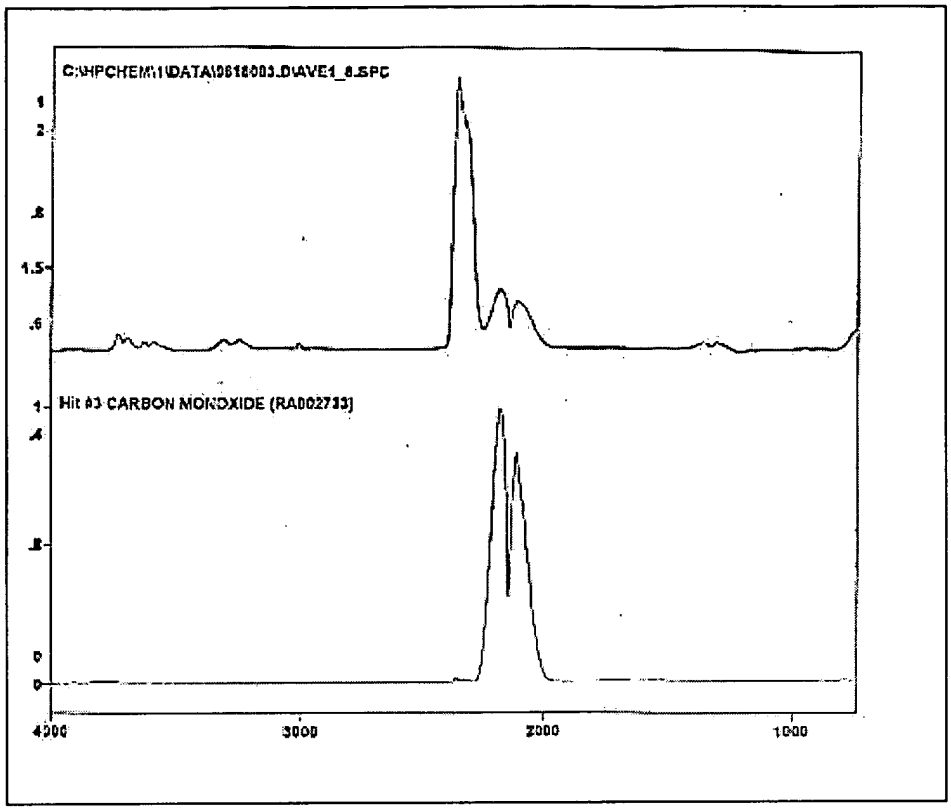

FIGURE 3.10. The anomalous IR signature of CO_2(top) compared to the conventional one (bottom), establishing a polarization of the orbits of valence and other electrons.

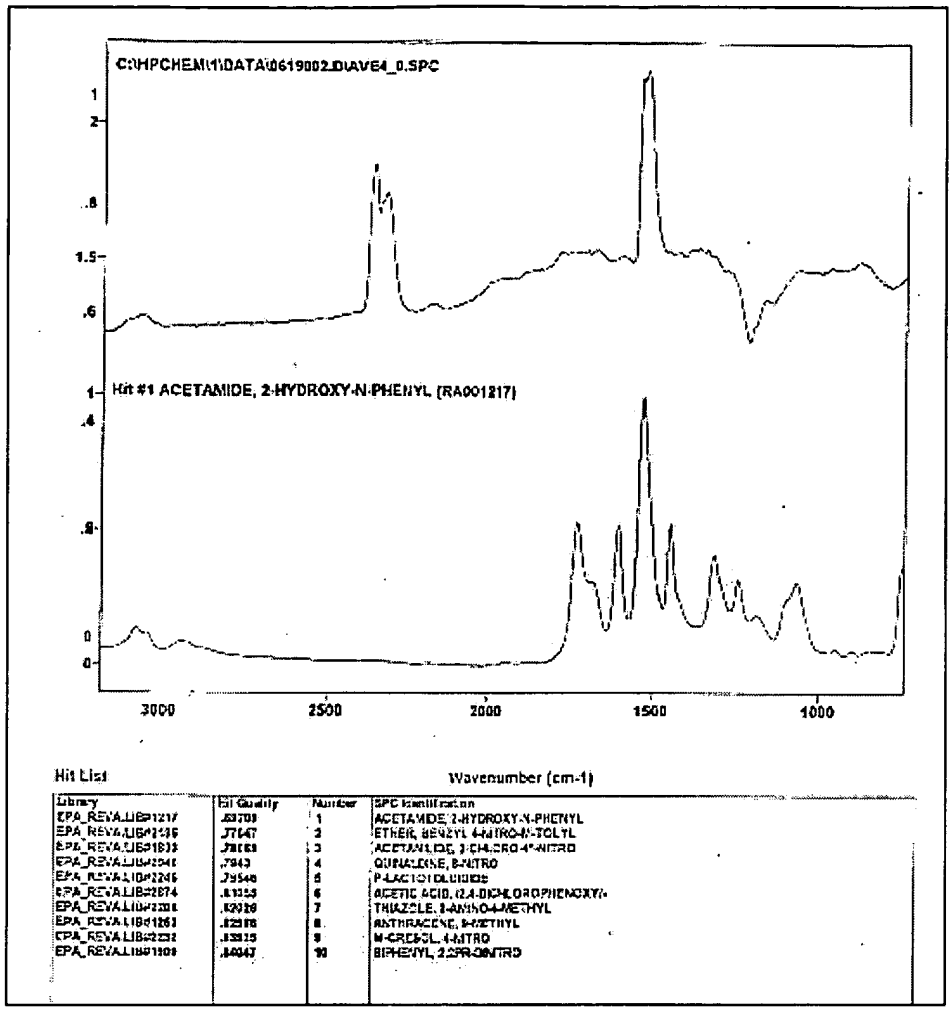

FIGURE 3.11. Example of unknown IR signatures.

The anomaly of Figure .3.10 is particularly important, inasmuch as it provides experimental evidence for a mutation the structure of conventional molecules with the presence of additional strong internal binding forces, also expected to be of magnetic type, that is expected to explain the increased energy content.

To appraise the implication of this aspect alone, one should consider the fact that it provides experimental evidence o the polarization of the orbits of internal nonvalence electrons, evidently because valence electrons cannot provide any additional molecular bond for both conventional and hadronic chemistry.

The NTS analysts also inspected small peaks in the IR scan, that all resulted to be "unknown", as shown in Figure 3. thus completing the experimental evidence of the anomalous IR behavior.

Following the above measurements, the following signed report dated June 23, 1998 was released by the NTS Laboratory [see the original in App. I of Ref. [9]]:

"Dear Dr. Santilli,
Thank you for the opportunity to provide analytic data on AquaFuelTM. Attached are all GCMS and concomitant GC-IR data that we obtained for the unfiltered sample. ... Our blank runs obtained before and after the analyses show no high mass spectra, thus proving that the high molecular weight species found were actually in the AquaFuelTM sample.

.... Search results using a library of 138,000 chemical compounds, did not indicate any matches with this high molecular weight species found in AquaFuelTM. Based on the limitations of our equipment and our inability to find a library match, the identification of this mysterious AquaFuelTM ingredient is an unknown.[2]

National Technical Systems
Louis A. Dee
Branch Manager"

The measurements on the same sample of magnetically polarized gas tested at NTS were repeated on July 25, 1998, b analyst Kevin Lothridge via a GC-MS_IRD located at the PINELLAS COUNTY FORENSIC LABORATORY [PCFL of Largo, Florida, under TTL support (for complete documentation see App. II of Ref. [9]).

The equipment consisted of an HP GC model 5890 Series II, an HP MS model 5970 and an HP IRD model 5965B. Even though similar to the equipment used at NTS, the PCFL equipment was significantly different inasmuch as the temperature had to be increased from 10 C to 55 C and the ramp time reduced from 26 minutes to 1 minute. The latte reduction implied the cramping of all peaks of Figure 3.1 into one single large peak, a feature confirmed by all subsequent GC-MS tests with short ramp time. Despite these differences, the test at PCFL confirmed all Anomalies 1 4 first detected at NTS. In addition, the tests provided the first experimental evidence of additional anomalies.

Analyst Kevin Lothridge conducted two MS tests of the same polarized gas sample at different times about 30 minute apart. As one can see in the original scans [9], the test at PCFL provided the first experimental evidence of Anomaly the mutation in time of magnecules. In fact, the peaks of the same gas at same conditions, but at different times are macroscopically different from each other.

This difference provided evidence that, when colliding, magnecules can break down into ordinary molecules, atoms, and fragments of magnecules, that then recombine with other molecules, atoms, and_or magnecules to form new unknown peaks.

Equivalently, the experimental evidence establishes the expectation that mutation of magnecules can simply occur via the accretion or release of another polarized atoms or molecule without breaking down.

As one can see in the scans [9], the tests conducted by analyst Kevin Lothridge also provided the first experimental evidence that the background following the end of the measurements resulted to be significantly similar to the MS sca thus providing a direct experimental verification of Anomaly 7 on the anomalous adhesion of magnecules.

The original background prior to the measurements was reobtained only after flushing the instrument with an inert gas at about 250 C. Such flushing heated the interior walls and parts of the instrument, thus breaking down all magnecule terminating their anomalous adhesion and reestablishing their conventional molecular structure.

A third independent verification of Santilli's magnecules was conducted on July 29, 1998, by analyst David Fries at t CENTER FOR OCEAN TECHNOLOGY of the UNIVERSITY OF SOUTH FLORIDA [USF] in St. Petersburg, und TTL support. The test were done via the use of a GC-MS Varian 2000 in which the GGC had been removed and replaced by a modified Paul Trap that turned the instrument into a Ion Trap Mass Spectrometer [ITMS].

Since the equipment belongs to an academic laboratory, it was not equipped with an IRD. This is unfortunate for scientific knowledge, because Paul's Trap is based on a locally strong magnetic field, that is expected to polarize all conventional molecules [although in an amount evidently less than the extreme magnetic fields of an electric arc].

In fact, the background of the instrument prior to the initiation of measurements showed various peaks that were tentatively identified as conventional molecules, from the sole shape in the MS. Only the additional presence and use an IRD would have permitted the scientific identification of the peaks, because of the sole existence of two possibilities: the IR signatures of the peaks in the background are those of the believed conventional molecules; or sai peaks have no IR signature at all, in that case they cannot possibly be conventional molecules.

As one can see in Appendix III of Ref. [9], despite the lack of IRD, the measurements provided a third independent verification of all preceding experimental evidence on the existence of magnecules.

Moreover, the USF measurements provided the first evidence on the existence of magnecules of individual hydrogen atoms. This was due to the accretion or loss by various peaks of only one hydrogen atom due to variations of only on a.m.u. This result was expected because of the known high sensitivity of Paul's Trap. The presence in the magnecule of other individual atoms [such as C or O] is implied in the preceding NTS and PCFL measurements, although it is b established for the case of the hydrogen.

In view of the above occurrence, inspection of the various MS scans indicates the absence in magnecules of systemati numerical periodicities, e.g., their systematic increase with periodicity two [sole accretion of H2 molecules], or thirty eight [sole accretion of CO molecules]. Experimental evidence on the disappearance of all unknown peaks at sufficiently high temperatures was established for the first time by Dr. N. Palibroda and Dr. P. Glueck at the INSTITUTE FOR ISOTOPIC AND MOLECULAR TECHNOLOGIES [IIMT] of Cluj-Napoka, Romania, also under TTL support, via a GC-MS MAT 311. When operated at 150 C, the same sample of polarized gas tested at NTS, PCF and USF, showed no unknown species at all, and only ordinary light gases with ppm of more complex composites of O and C, the latter mostly due to contaminants. This result provided additional support on magnecules as being made up of ordinary molecules and atoms under a new bond of magnetic origin. Additional experimental confirmation of th above GC-MS/IRD results have been conducted and are reported in monograph [9].

3.4.C. ORIGIN OF ANOMALOUS ENERGY RELEASE

As indicated earlier, a most significant aspect of the class of magnetically polarized gases is their anomalous energy content. According to quantum chemistry,

1) New internal bonds in ordinary molecules Recall that peaks in the IR scan essentially represent internal molecular bonds. The IR scan of Figure 3.10 is particularly important because it establishes the existence in the CO {sub}2{/sub} molecule of two new internal bonds characterized by the two new peaks. It is evident that these bonds cannot be of valence type, since that bond is already represented by the large IR peak of the same figure. The only possible explanation of the above experimental evidence is therefore that the two new internal bonds are of magnetic type. In turn, the only possible explanation is that the intense magnetic fields of the electric arc polarize also the orbit of internal, non-valence electrons, thus creating new magnetic bonds within the structure of conventional molecules themselves, in addition to magnetic bonds between molecules. Calculations show that these new, internal, magnetic, molecular bonds can store a virtually unlimited amount of energy, thus providing the first explanation of the anomalo energy content of magnegas.

2) Bigger efficiency in chemical reactions. Energies released by chemical reactions in gases, such as the basic reactions

$$H_2 + O_2 / 2 \rightarrow H_2O + 57 \text{ Kcal /mol},$$

have been measured until now for gas molecules in their conventional spherical distributions of peripheral atomic electrons due to rotations. According to hadronic chemistry [5-7], it is easy to see that, before the above reaction can take place, the orbits of the valence electrons of the hydrogen and oxygen must be polarized in a plane, so as to perm their bonding into the isoelectronium (Figure 3.4). It is evident that magnetically polarized gas molecules admit chemical reactions with an efficiency bigger than that of conventional molecules, because the atoms to be bonded already have the necessary polarization. It then follows that conventional reactions for magnetically polarized gases release more energy than the same reactions for conventional gases, thus providing a second explanation for the anomalous energy content of the class of gases known as Magnegases^TM. Needless to say, the same enhancement o energy release for magnetically polarized gases applies also for all other esoenergetic chemical reactions.

3) Molecular attractions. Ordinary gas molecules have no mutual attractions, again, due to their intrinsic rotations, while magnetically polarized molecules can attract each other, thus implying an additional increase in the efficiency of chemical reactions, such as the synthesis of water. Magnegases have a BTU content of at least 3 times th

predicted by quantum chemistry. Their primary chemical reaction during combustion is the burning of hydrogen and oxygen into water. Note that a 3-fold increase of energy release implies the increase of energy released by the water reaction, from 57 Kcal_mole to about 150 Kcal/mole.

In summary, the dramatic increase of energy release by magnetically polarized gases, of at least three times that of unpolarized gases, is the most convincing evidence on the insufficiencies of quantum chemistry in its most important topic, the molecular structure [8].

The anomalous energy content outlined in this section also clarifies the extreme difficulties encountered in the measur of the energy content of magnetically polarized gases. The anomalies establish that all existing calorimeters are not suited for the measurement of energy release under the above anomalies.

3.5. EXPERIMENTAL EVIDENCE OF SANTILLI'S MAGNECULES IN LIQUIDS

3.5.A. FORMATION OF MAGNECULES IN LIQUIDS

The way in which Santilli [8] first created magnecules in liquids is the following. In early 1998 he obtained a number of samples of fragrance oils thanks to the courtesy of the multinational giant in the fragrance industry, GIVAUDAN ROURE CORPORATION [GR].

Santilli then placed about 50 cc of various samples of perfectly transparent fragrance oils in individual glass container and exposed them to magnetic fields according to geometries and procedures under patent pending.

Starting with perfectly clear oils of known viscosity, Santilli observed after a few days a visible darkening of the oils, jointly with a visible increase of the viscosity. The changes evidently varied from oil to oil. Both the darkening and th viscosity increased progressively in subsequent days, to reach in certain cases a dark brown color completely opaque light. The viscosity increased to such an extent that some of the oils lost all their fluidity.

Following the darkening, in certain samples, there was the creation of floating objects that grew in time to such a size to be visible to the naked eye. These visible effects are of pure magnetic origin because of the lack of any other contribution, e.g., the complete absence of any additives or exposure to any field other than magnetic. After the magnetic treatment, all samples were left undisturbed at ordinary room conditions.

The above tests established beyond scientific doubt that the alteration of the characteristics of the oils was of sole magnetic origin, thus excluding all other possible sources.

Santilli's [loc. cit.] main hypothesis on the reason for the darkness of the oils is that their molecules acquire a magnet polarization in the orbits of at least some of their electrons [cyclotron resonance orbits], by therefore bonding to each other as it occurs for gases.

3.5.B. PHOTOGRAPHIC EVIDENCE OF MAGNECULES IN LIQUIDS

The alteration of the structure of fragrance oils under suitable magnetic exposures was first confirmed by photograph taken with a microscope with minimal magnification, as illustrated in the pictures of Figures 3.12 (see monograph [9] for several other photographic evidence).

Figures 3.12 refers to the GR fragrance oil received under the code "ING258AIN, Test 2" subjected to the rudimenta magnetic polarization indicated in the preceding section under the respective magnification 10X and 100X.

As one can see, these photographs establish that, under the indicated magnetic treatment, the oil has acquired a structure of the type of "brick layering" that is visible under only 10X magnification [top of Figs. 3.12]. This layerin is, per se, highly anomalous for a liquid that was originally fully transparent. Note that Santilli's magnecules are not

constituted by the individual "bricks" shown in the 100X magnification [bottom of the figures], but rather by the dark substance thjat interlock said "bricks".

Inspection of the various photographs shows a variety of sizes of magnecules, thus establishing their lack of unique characteristics for any given oil. This evidently confirms the lack of a valence bond [because the latter would imply a fixed maximal size]. The photographs also show the magnecules capability for accretion, that is, the capability of increasing their size via the addition of further oil molecules.

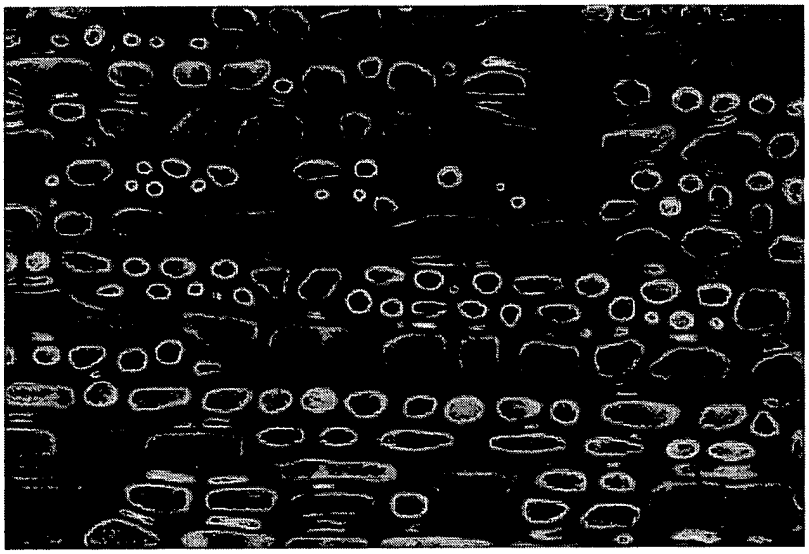

FIGURE 3.12: First photographic evidence of Prof. Santilli's new chemical species of magnecules in liquids obtained on January 28, 1999, by Dr. Konrad Lerch, Director of the GivaudanRoure Research Laboratory in Dubendorf, Switzerland, on the GR fragrance oi "ING258IN Test 2" under magnification 100X. The new chemical species of Magnecules was instrumental for the subsequent discovery by Prof. Santilli of the overunity PlasmaArcFlow Reactor and its applications.

3.5.C SPECTROSCOPIC EVIDENCE OF MAGNECULES IN LIQUIDS

The first experimental evidence of Santilli's magneclusters in liquids was established on May 5, 1998, by analysts Br Wallace and Mia Burnett at TEKMARDOHRMANN CORPORATION [TDC] in Cincinnati, Ohio, operating a Tekmar 7000 HT Static Headspacer Autosampler equipped with a Flame Ionization Detector [FID]. The tests were repeated on May 8 and 11, 1998, by confirming the preceding results.

The measurements were done on: Sample 1, pure [magnetically untreated] GR "Fragrance Oil 2"; Sample 2, magnetically untreated tap water; and Sample 3, a magnetically treated mixture of the two.

It should be noted that the Tekmar equipment lacks the computer search as well as the UV scan. Also, recall that magnecules in a light gas can have molecular weight all the way to 10,000 a.m.u. and more.

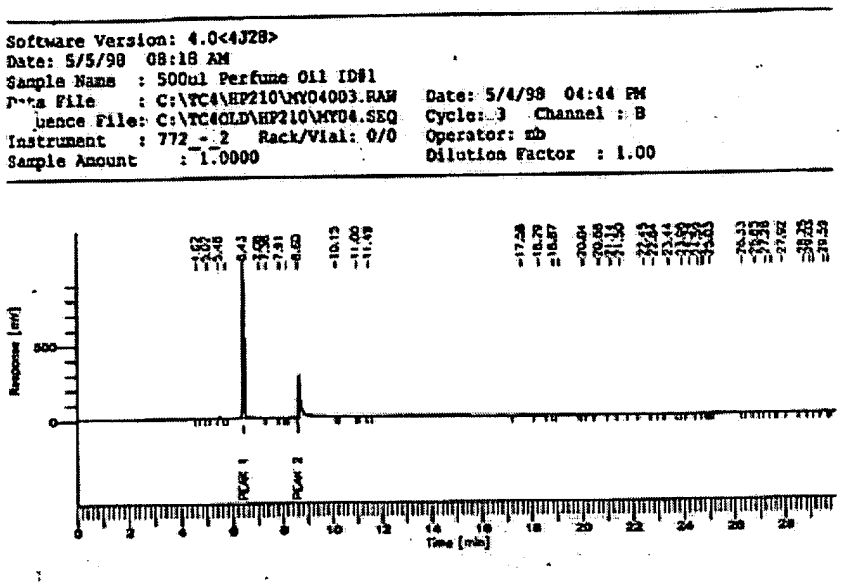

FIGURE 3.13. A reproduction of one of the scans conducted on May 5, 1998, at 8.18 a.m., by analysts Brian Wallace and Mia Burnet at TEKMAR-DOHRMANN CORPORATION [TDC] in Cincinnati, Ohio, by operating a Tekmar 7000 HT Static Headspacer Autosampler equipped with a Flame Ionization Detector [FID]. The scan is for exactly the same sample of GR fragrance oil of Figure 3.12, although for its magnetically unpolarized form. The oil results to be composed by three primary molecular constituents with: Peak 1 at 6.430 min and 24.28 %; Peak 2 at 8.604 min and 3.19 %; and Peak 3 at 37.742 and 70.00 % [the latter one being off scan scale], totaling 97.57 %.

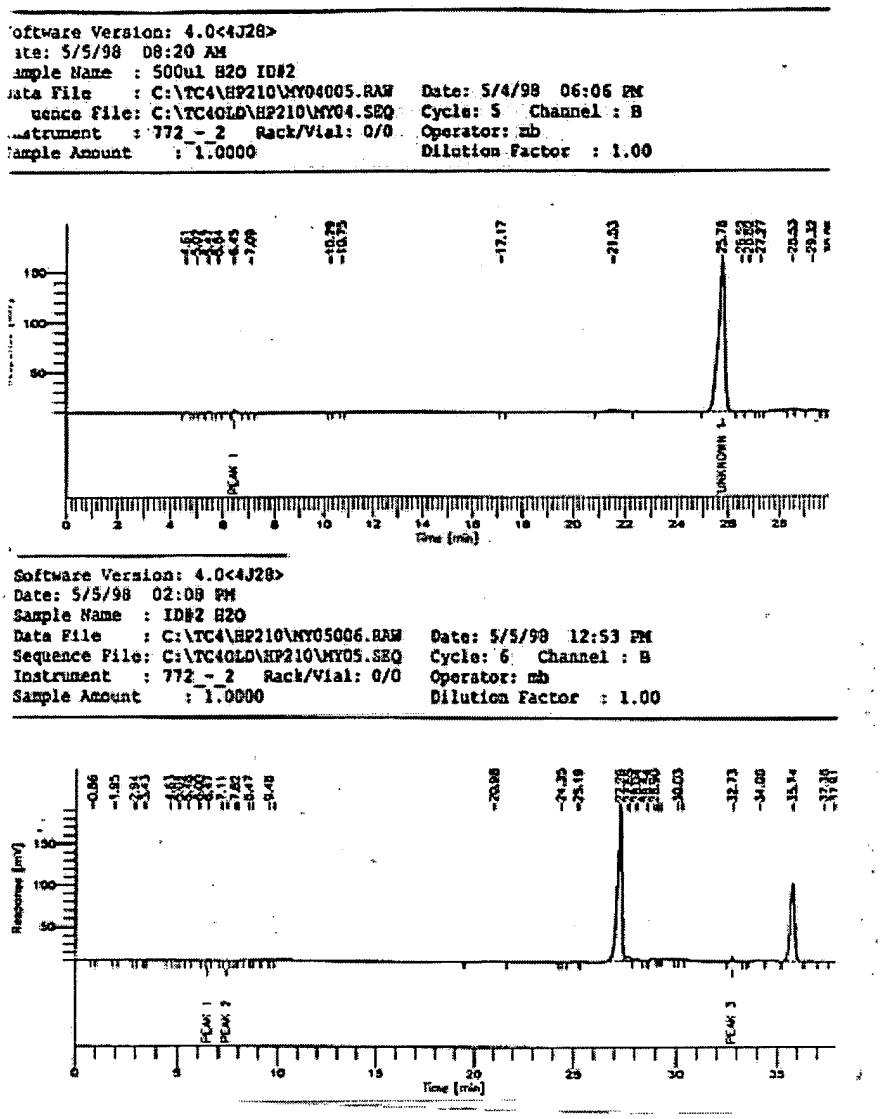

FIGURE 3.14. A reproduction of some of the various scans conducted by TDC on the magnetically polarized version of the GR fragrance oil of the scan of Figure 3.13. Santilli's magnecules are established by the appearance of the "unknown" peaks in large percentages that do not exist in the magnetically untreated oil. Note numerous additional variations, such as the decrease of the percentage of the conventional molecular peaks (see monograph [9] for the complete reproduction of all peaks, including the related percentages).

Comprehensive tests via a very modern equipment for Liquid Chromatographic Mass Spectroscopy [LCMS] with UltraViolet Detector [UVD] were conducted on the same GR fragrance oil "ING258IN Test 2" of Figures 3.12, 3.13 and 3.13, on December 1, 1998, by Prof. Kenneth G. Furton, Chairman, and Prof. Piero R. Gardinali, Laboratory Director, DEPARTMENT OF CHEMISTRY of FLORIDA INTERNATIONAL UNIVERSITY [FIU], Miami, Florid [8]. The tests were then repeated on December 17 and 18 by confirming the preceding results.

The tests were conducted under a number of technical characterizations specifically selected to detect magnecules, among which:

1) Total Ion Chromatogram [TIC] collected under the positive ion atmospheric pressure electrospray ionization [ESI+] mode;
2) Integrated TIC with retention times and areas for the most abundant peaks;
3) Raw mass spectra for all peaks identified in item 2;

4) HPLC chromatograms collected at fixed wavelength of 254 cm;
5) UV-visible spectra form the HPLC diode array detector from 230 to 700 mm.

The tests were conducted on the following samples: A) Sample GR331, the magnetically untreated, fully transparent GR fragrance oil "ING258IN Test 2";

B) Sample GR332, magnetically treated ING258IN Test 2 with 10 % DiproPylene Glycol [DPG];

C) Sample GR332S, bottom layer of the preceding sample;

D) Sample GR335, magnetically treated mixture 4 % GR fragrance of ING258IN Test 2², 0.4 % DPG and 95 % tap water;

E) Sample GR335O, visible dark clusters in the preceding sample.

These tests provided conclusive experimental evidence on the existence of Santilli's magnecules in liquids. To avoid a prohibitive length of this presentation, in the following we reproduce only a few printout of the comprehensive and detailed documentation obtained at FIU [that is available in its entirety as Appendix V of Ref. [9].

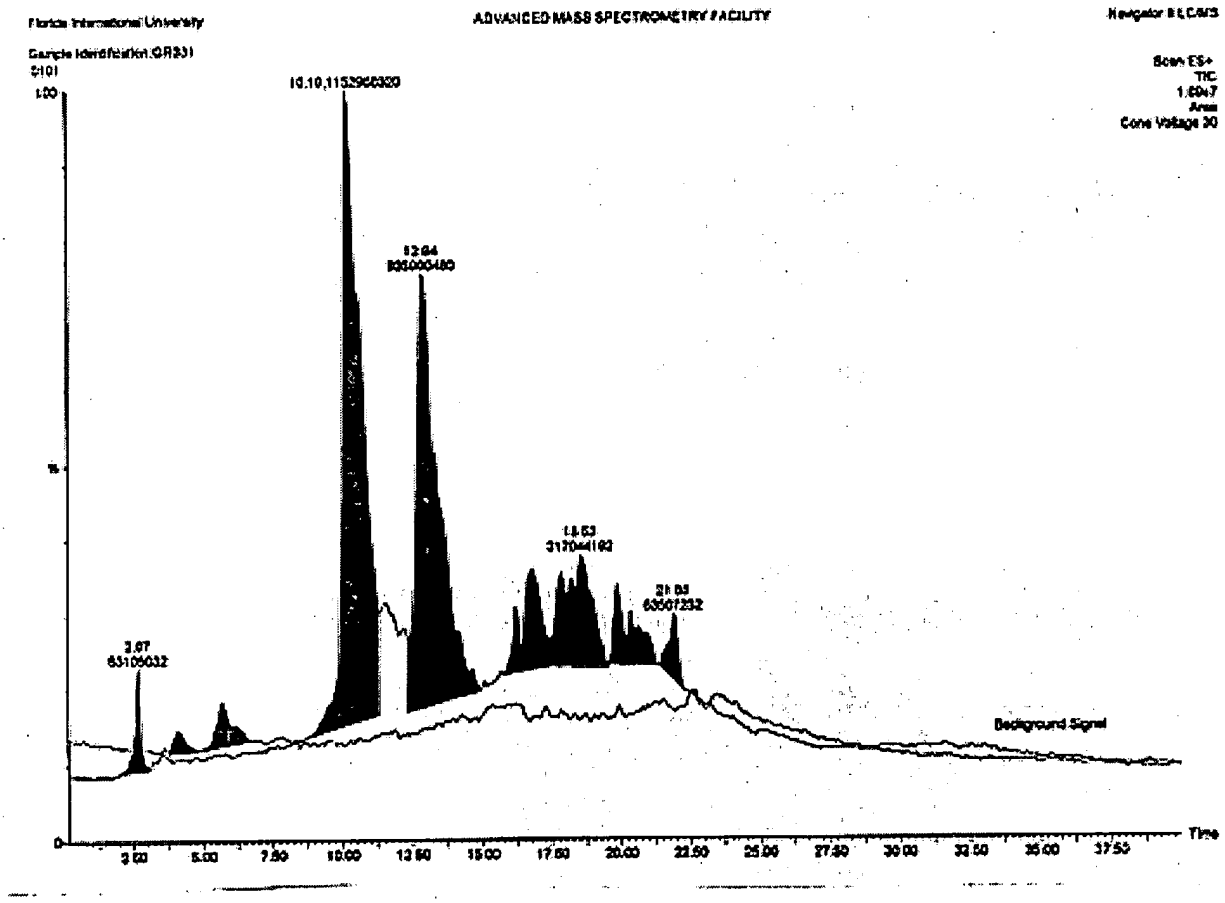

FIGURE 3.15: FIU scan on the untreated GR oil "ING258IN Test 2" of Figures 3.12, 3.13, and 3.14.

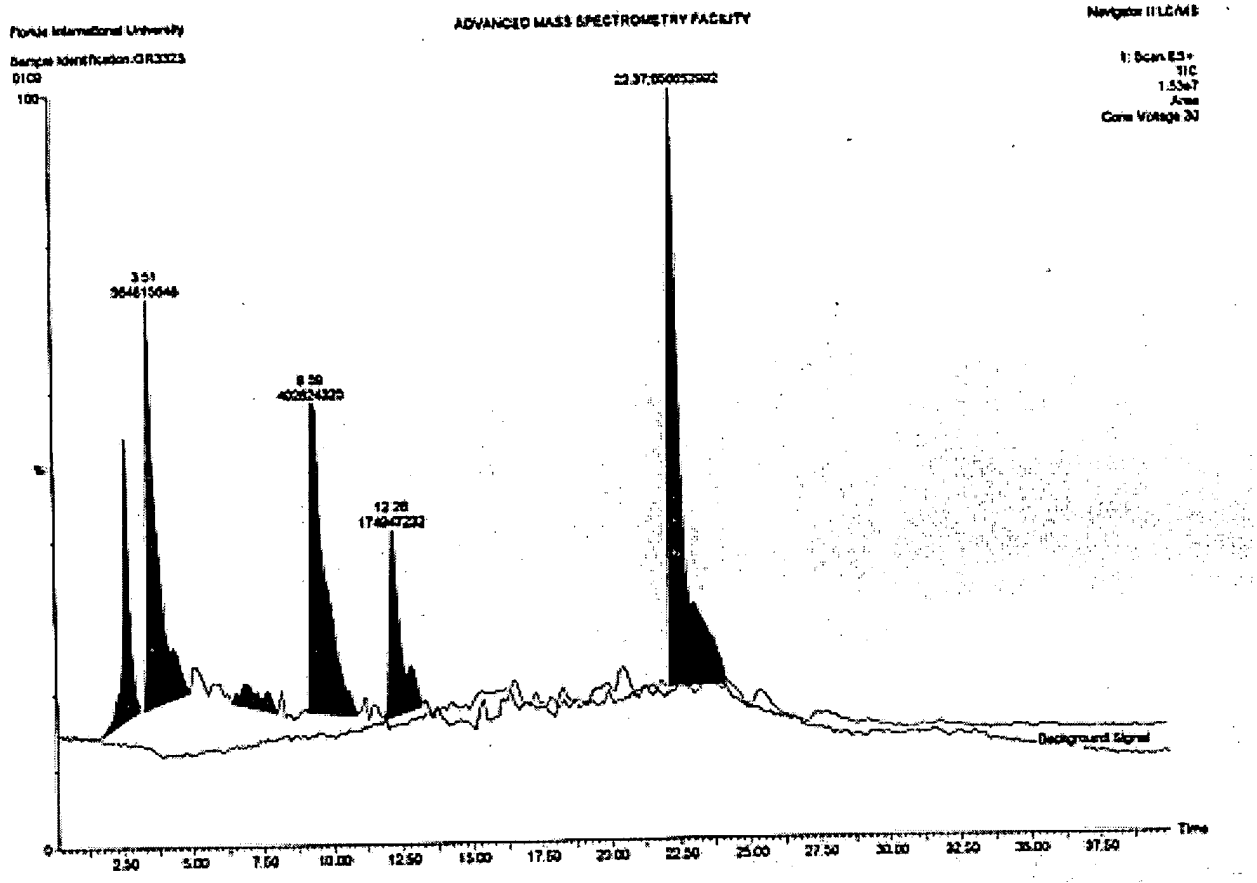

FIGURE 3.16: FIU scan on the chemical structure of the magnetically treated GR oil "ING258IN Test 2". Santilli's magnecules in liquids is established by the large new peak on the r.h.s.

3.5.D. MAGNETIC MUTATION OF PHYSICAL CHARACTERISTICS IN LIQUIDS

The existence of SANTILLI'S magnecules in liquids implies necessary alterations, called mutations [8], of physical characteristics, such as increase of the specific density and viscosity. This is due to the fact that magnetic bonds amon ordinary molecules imply an evident reduction of intermolecular distances, thus resulting in more molecules per unit volume as compared to the magnetically untreated liquid. The increase in viscosity is then consequential.

The reader should be aware that we are referring to large macroscopic alterations often visible to the naked eye, that at times such to alter completely the original features, as it was the case the complete loss of transparency and fluidity in the magnetically treated oils of the preceding sections.

At a deeper level, it appears that the mutation of physical characteristics are due to various contributions, such as:

1) the elimination under a suitable magnetic field of [at least some of the] rotational motions of the molecules that, pe se, implies a decrease of their average volume with consequential increase of the specific density;

2) the polarization of the orbits of the valence electrons that imply an additional decrease of the average molecular volume and consequential increase of the specific density, viscosity and other characteristics; and

3) the magnetic bond among different molecules that implies additional contributions to the indicated mutations.

In this section we report direct experimental evidence on measurements of specific density, viscosity and other

characteristics first presented in Ref. [8], that confirms the above prediction.

The samples used ordinary tap water and a number of GR fragrant oils. All samples here considered were prepared b conventionally mixing tap water and one fragrant oil and then submitting that mixture to rather weak permanent magnets of 200 G [much weaker than those used for Pictures 3,12] via an equipment under patent pending. All sampl resulted to be very stable at ordinary conditions without any measurable change over a period of about year.

In early 1998, Santilli [loc. cit.] prepared various samples along the above procedure numbered from 1 to 25. The measurements of the specific density were conducted on March 9, 1998 by analyst Dr. A. Sibille at the SGS U.S. TESTING COMPANY, INC. [USTC] of Fairfield, New Jersey. The results of the tests are presented in derails in Re [8.9].

In the transition from Sample 1 [untreated water] to Sample 2 [magnetically treated water] there is an increase of the specific density in the macroscopic amount of 0.86% thus confirming the indicated magnetic mutation of water. In tu the increase in density supports the existence of magneplexes in magnetically treated water.

As well known, fragrance oils are [generally] lighter than water, i.e., the specific density of the untreated fragrance i smaller than that of the untreated water. According to quantum chemistry, the specific density of any mixture of the above two liquids, whether solution, suspension or dispersion, must be in between the lighter and heavier specific densities.

On the contrary, the specific density of the magnetically treated mixture of GRAPC fragrance 1[2] with tap water, resulted to be bigger than that of the densest liquid, the water. This measurement constitutes additional, rather strong direct experimental verification of the magnetic mutation of physical characteristics in liquids.

The reader should be made aware that the above anomaly [a mixture of two liquids whose specific density is bigger than that of the heaviest of the two] cannot be explained via conventional quantum chemical knowledge.

` On the contrary, the anomaly is theoretically predicted and quantitatively treatable by the covering hadronic chemis [5-7] via the creation of magnecules. A remarkable feature is that the magnetic mutations of density are macroscopically large. In fact, they were called by an analyst "UPS-type anomalies", meaning that the shipment via UPS of a given volume of a magnetically treated liquid requires an increase of the shipping cost due to the macroscop increase of the weight.

A further prediction of magnetically polarized liquids is the increase of its viscosity . This is evidently due to the arbitrary size of an individual magnecule, as well as the tendency of the same to bond nearby molecules, resulting in accretions, not to mention the anomalous adhesion to the walls of the container that has been systematically detected for all magnetically polarized liquids.

As indicated earlier, in certain cases the increase of viscosity is so large to be first visible to the naked eye and, when the treatment is sufficiently protracted, the increase of viscosity is such to lose the customary liquid mobility.

The measurements on viscosity are reported in Refs. [8,9]. They were done on March 9, 1998 by analyst J. R. Tymin at SGS U.S. TESTING COMPANY, INC. of Fairfield, New Jersey. The selected sample was an engine oil 80-Castrol Motor Oil subjected to magnetic treatments via two different equipment called of Type A and B. All treatmens were done at ordinary conditions in the outsider of the oil container without any additive or change of conditions of a type. Yet the measurements established an increase of viscosity of 51.2%.

The tests on viscosity also provide evidence of the anomalous adhesion of liquids with magnecules that is established in this case by a dramatic, macroscopic increase of adhesion of the oil to the walls of the glass container, an adhesion that is visible by the naked eye.

The same macroscopic anomaly is confirmed at the microscopic level. During the measurement of viscosity there was

such an anomalous adhesion of the magnetically treated oils to the walls of the instrument that could not be removed via routine cleaning with acetone and required the use of strong acids.

This anomalous adhesion is further experimental evidence on the existence of Santilli's magnecules because of their predicted capability to induce the polarization of the orbits of the valence electrons of the atoms in the walls of the container, thus resulting in anomalous adhesion via magnetic bonds due to induction.

It is evident that the magnetic mutations of density and viscosity implies the expected mutation of all other physical characteristics of the liquid considered. Measurements along these lines are solicited.

The existence of mutation of physical characteristics then implies the mutation of chemical features. An illustration is given by the visual evidence reported by the analysts of USTC according to which the reaction of magnetically treated oils with acetone is dramatically different than that with untreated oil, beginning with a visual mutation in color, textu and other appearances.

3.5.E. EVIDENCE OF SANTILLI'S MAGNECULES IN SOLIDS

The direct experimental evidence on the existence of magnecules in solids available at this writing is given by the evidence that all liquids with magnecules preserve the new species when frozen, as established by the recovering of anomalous features when returning to the liquid state, including the recovering at the liquid state of opacity and other features prior to freezing.

Needless to say, the above simplest possible evidence is only the beginning of various possibilities, such as the true chemical composition of solids created under intense magnetic fields, such as fullerenes {5} and other composites. These studies are under way and their outcome will be uploaded in this web site when available.

3.5.F. ADDITIONAL EXPERIMENTAL EVIDENCE OF SANTILLI'S MAGNECULES^TM

prepared by J. V. Kadeisvili

As indicated earlier in this web page, Santilli's magnecules were first established experimentally in June 1998 at the Mc\Clellan Air Force Base near Sacramento, California, and then confirmed in July 1998 the subsequent month of Ju at the Pinellas Forensic Laboratory, Florida, in November 1998 at the university of South Florida in St Petersburg, Florida, and in January 1999 at the analytic laboratory of the Chemistry Department of Florida International Universi in Miami.

An additional experimental verification has been recently conducted by analyst Dr. **Jeffrey Riggs**, director of the National technical Laboratories in North Highlands, California, that have confirmed ALL predictions by Prof. Santill in his original memoir [8], as well as all preceding analyses.

The analyses were conducted, specifically, with Santilli's Magnegas^TM produced by TTL Recyclers (see the preceding Part 2 and the web site http://www.toupstech.com. A copy of the rather voluminous documentation is available in the forthcoming monograph [9]. For brevity we here reproduce below the official letter by the analyst, as well as two representative scans.

January 24, 2000
FROM: National Technical Systems, North Highland, CA
TO: Toups Technology Licensing, Largo, Florida
SUBJECT: Analysis of Santilli's Magnegas^TM via GCMS and FTIR

The analysis of the Magnegas^TM air samples gave no conclusive mass spectra data. The computer library of 138 compounds was searched for matching spectra. No matches were obtained by the instrument, either in the low or in the high temperature methods. There were large peaks that would appear randomly in the analyses, but the computer was unable to identify any of the peaks that were seen.

The anomalies of the large peaks that were detected in the GCMS traces even remained in the blanks that were analyzed after the samples. The interpretation of these peaks is beyond the scope of the instrumentation used.

Therefore, the identity of these peaks remains a mystery.

The FTIR was able to identify carbon monoxide, carbon dioxide, and the presence of hydrocarbons due to the carbon-hydrogen stretches at the 3000 cm^-1 range.

Since the FTIR in the GCMS could not be used, no real time trace of any corresponding peaks on the mass spectra output could be compared to the FTIR. However, as per conversation with Dr. santilli, an FTIR with a long path gas cell (approximately 20 meters) was used instead. It gave evidence of carbon monoxide, carbon dioxide, and hydrocarbons due to the various wavelengths seen. Other infrared spectra were detected also, but the spectra were beyond the capabilities of the instrument used to identify the samples any further.

All of the GCMS and FTIR scans and library searches are included in the data package. Also, with the FTIR data is included the reference spectra of several of the compounds observed. Analyst:
Jeffrey Riggs

As the visitor can see, the NTS analyses identified the existence of peaks in the GCMS none of that could be identifie and that have no IR counterpart. Similarly, the IR detector fully identified CO, CO and other conventional molecules that had no identification in the GCMS. This evidence establishes that the peaks do not possess a valence structure, an all the conventional molecules identified in the FTIR are necessary constituents of the unidentified peaks in the GCM

In his letter, Dr. Riggs explicitly confirm the anomalous adhesion of magnecules^TM as predicted by Santilli [8], sin the blanks after the tests show essentially the same spectra as the original gas. Since electrostatic bonds are known to very weak and unstable, this establishes that the anomalous adhesion by Magnegas to the instrument is of magnetic origin. By recalling that the gas samples were created under very intense magnetic fields, these data establish that the unidentified peaks in the GCMS are Santilli's magnecules^TM.

Close inspection of the rather voluminous documentation provides experimental verifications of each and every one o the anomalies of ,magnecules predicted by Santilli. For brevity we refer to monograph [9], and to the example of Figures 3.17 and 3.18 below.

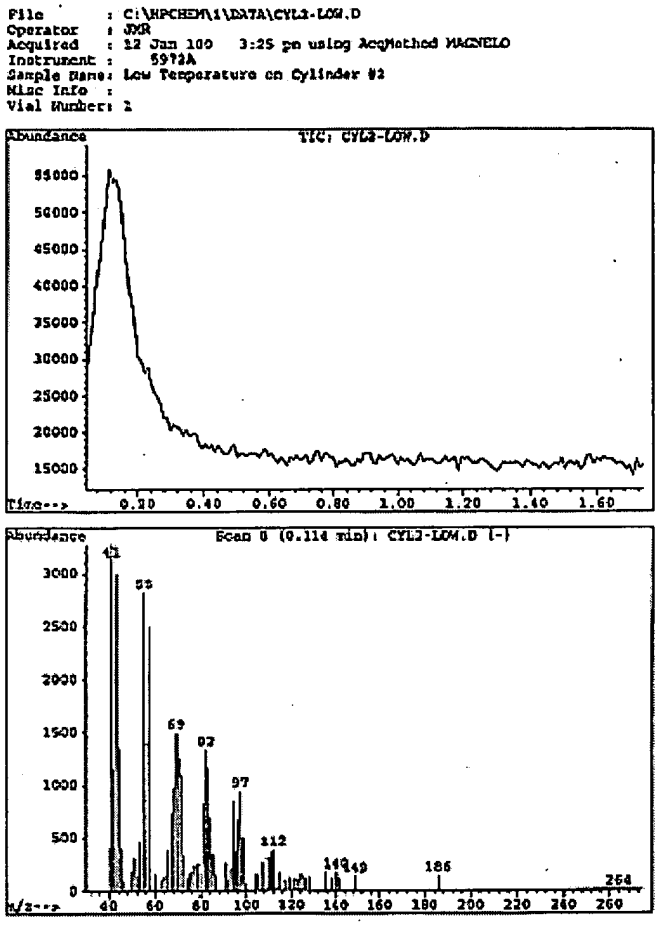

FIGURE 3.17: A reproduction of one of the numerous scans conducted on Santilli's Magnegas^TM in mid January 2000 by Dr. Jeffre Riggs of NTS Analytic Laboratories in North Highland, California, that establishes the unknown nature of the chemical composition o the gas, following a computer search among 138,000 molecules.

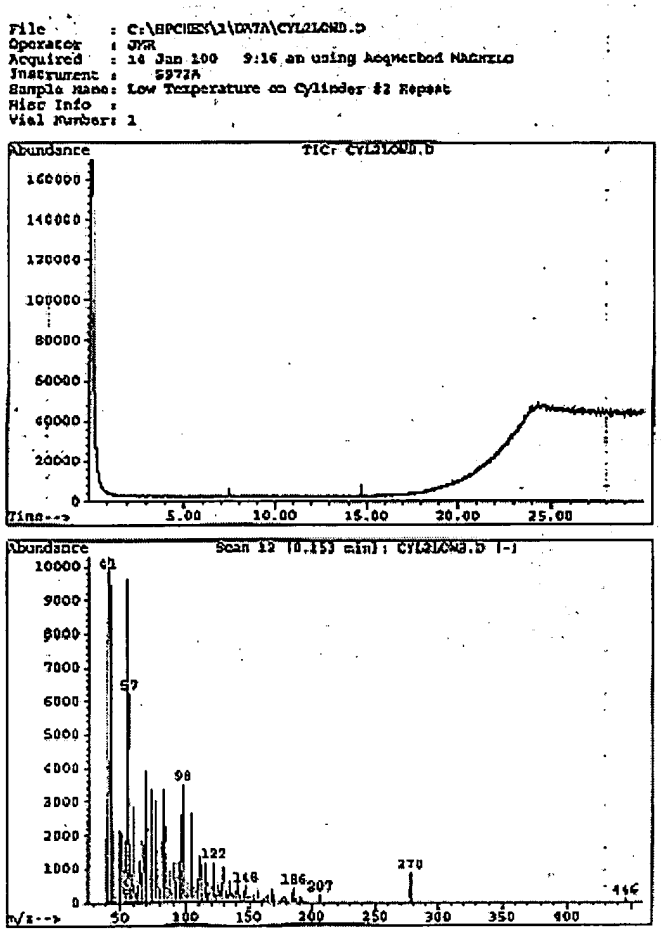

FIGURE 3.18: A reproduction of another GCMS scan at NTS conducted on exactly the same gas, on the same GCMS equipment, under the same conditions (except for a longer ramp time), that establishes the mutation of Santilli's magnecules. In fact, as one can see, the clusters of this scan are different than those of the preceding scan. Note also in the same cluster the variation from 97 amu to 98 amu, that can only be explained via the accretion of one individual hydrogen atom. This confirms the presence in Santilli's magnecules of individual atoms, besides ordinary molecules. The difference between 55 amu and 57 amu then establishes the accretion of the magnecule by one hydrogen molecule. Other Santilli mutations have a variety of interpretations.

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APPENDIX: TABLE OF CONTENTS OF SANTILLI'S REF. [1,2], "THE PHYSICS OF NEW CLEAN ENERGIES AND FUELS"